ANNUAL PROGRESS REPORT
Plant Science Pamphlet #71 December 1992

WEST RIVER AGRICULTURAL RESEARCH AND EXTENSION CENTER
CROPS AND SOILS RESEARCH

Rapid City, South Dakota

Introduction

This is an annual progress report of the West River Crops and Soils Research Projects, South Dakota Agricultural Experiment Station. The equipment storage and processing facilities are located approximately 1 mile southwest of the village of Box Elder at 21 County Road 212. The office facilities are located on the Central States Fairgrounds at 801 San Francisco Street, Rapid City, SD 57701-3097. Telephone 605/394-2236.

The Research Projects serve the western part of the state. They are unique in that all experimental plots are cooperatively located with Farmers, Ranchers, or Crop Improvement Associations, through Extension Agents.

The research conducted is not restricted to a specific area, crop, or soil, but by necessity of workload, investigates only those problems which are pertinent to general areas. This report contains results of selected research. It does not include results of work conducted by projects headquartered from the campus at Brookings.

FIELD PLOT COOPERATORS

Name	Address	County
County Crop Impr. Ass'n	Martin 57551	Bennett
David Reaser	Oelrichs 57763	Fall River
Roger Rosenow	Ralph 57650	Harding
Paul Patterson	Draper 57531	Jones
Gary Hawks	Plainview 57771	Meade
Tim Komes	Sturgis 57785	Meade
William Bielmaier	Wall 57790	Pennington
Robert Hayes	Wall 57790	Pennington
Richard Kjerstad	Quinn 57775	Pennington
Rodney Renner	Wall 57790	Pennington
Gary Wunder	Bison 57620	Perkins
Dave Vogel	Hayes 57537	Stanley
Sivage Farms	Hayes 57537	Stanley

This is an annual report and results published herein are therefore neither complete nor conclusive. 300 copies printed at an estimated cost of $3.16 each.

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Acknowledgements

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Research was conducted by H. A. Geise-Research Agronomist, C. E. Stymiest-Extension Agronomist, Bruce A. Swan-Sr Ag Res. Tech., and in conjunction with F. A. Cholick, D. L. Reeves, R. G. Hall, R. J. Pollman, and J. Ingemansen.

This publication was written and edited by Harry A. Geise, Ass't Professor.

Weather Summary

The data in the weather summaries presented in Tables 1 through 3 were obtained from the National Oceanic and Atmospheric Administration publication, Climatological Data - South Dakota, and from South Dakota Crop-Weather Summary published by the South Dakota Statistical Reporting Service-USDA.

Average air temperatures in August and September 1991 were several degrees above normal in Northwestern South Dakota but were near normal in Southwestern South Dakota. During October temperatures were several degrees below normal over the entire region. November temperatures ranged from 3-7 degrees below normal. December temperatures were 8-10 degrees above normal in the Northwest and 4-5 degrees above normal in the Southwest. January temperatures were from 9 degrees above normal in the Southwest to 17 degrees above normal in the Northwest. During February and March the trend continued with temperatures averaging from 8 to 13 degrees above normal. April and May temperatures varied from 2-4 degrees above normal with a late killing frost at the end of May. In June, the temperatures were 2-4 degree below normal, and during July, 7-14 degrees below normal. In summary, late summer was normal, autumn was cool, winter was very mild, spring was mild, and summer 1992 was quite cool.

Precipitation records during the year indicate slightly below normal precipitation was received during August and September, near normal during October and November, and slightly below normal from December through April. May was quite variable. Precipitation over the region ranged from normal to two inches below normal. June and July were quite similar, while the western third of the state received an inch above normal, the central third of the state received up to four inches above normal. The temperature-precipitation pattern during June and July resulted in record breaking spring grain yields. However, summer crops were slow growing and did not mature before late Sept-ember frost.

The total usable moisture (Table 3) for the entire crop year varied from 15.1 inches at Murdo in Jones county to 7.2 inches at Rapid City in Pennington county. The Spring season usable moisture ranged from 10.7 inches at Bison to 4.7 inches at Martin.

TABLE 1. Weather Data - Average Temperatures and Total Precipitation by Months, with Departures from Normal.

Month & Year		Average Temperature*	Departure from Normal	Total Precipitation*	Departure from Normal
Martin (Bennett County Reporting Station)**					
Aug.	1991	71.6	-0.5	6.05	3.96
Sept.	1991	62.5	0.3	0.98	-0.28
Oct.	1991	48.8	-1.9	1.30	0.41
Nov.	1991	30.1	-6.2	1.18	0.80
Dec.	1991	31.3	5.0	Tr	-0.35
Jan.	1992	31.5	10.1	0.84	0.58
Feb.	1992	35.9	9.5	0.41	-0.01
Mar.	1992	41.5	8.4	1.70	0.77
Apr.	1992	48.2	2.5	0.54	-0.42
May	1992	58.9	2.2	0.92	-2.03
June	1992	63.6	-3.0	3.18	-0.19
July	1992	65.7	-8.1	4.04	1.68
Oelrichs (Fall River County Reporting Station)**					
Aug.	1991	73.4	0.5	2.13	0.59
Sept.	1991	62.5	0.2	0.69	-0.47
Oct.	1991	48.0	-2.4	1.38	0.53
Nov.	1991	31.5	-3.6	0.82	0.30
Dec.	1991	30.8	4.4	0.10	-0.32
Jan.	1992	30.5	8.6	0.45	0.05
Feb.	1992	37.0	9.2	0.92	0.38
Mar.	1992	42.2	7.7	1.98	0.95
Apr.	1992	48.2	2.0	0.57	1.38
May	1992	58.4	1.6	3.25	0.33
June	1992	63.5	-3.3	2.85	0.02
July	1992	65.9	-8.6	3.56	1.37
Ralph (Harding County Reporting Station)**					
Aug.	1991	73.1	5.2	1.00	-0.63
Sept.	1991	59.5	3.0	0.60	-0.61
Oct.	1991	43.1	-2.3	1.20	0.37
Nov.	1991	27.0	-2.8	0.63	0.29
Dec.	1991	27.5	7.8	0.01	-0.27
Jan.	1992	30.2	16.9	0.08	-0.19
Feb.	1992	32.5	12.5	0.02	-0.30
Mar.	1992	38.0	9.6	0.35	-0.11
Apr.	1992	44.6	2.4	0.90	-0.64
May	1992	57.1	3.3	1.98	-0.63
June	1992	62.8	0.1	4.47	1.01
July	1992	63.3	-6.3	2.93	1.01

*Average temperatures and precipitation obtained from NOAA Climatological Data from reporting station nearest the experimental sites. Temperatures are reported in degrees Fahrenheit and precipitation in inches.

**Departures from normal are based on records for the period 1951-1980(30 Yrs).

TABLE 1. Continued

Month & Year		Average Temperature*	Departure from Normal	Total Precipitation*	Departure from Normal
Murdo (Jones County Reporting Station)**					
Aug.	1991	74.5	0.9	2.13	0.28
Sept.	1991	62.9	-0.2	1.15	0.04
Oct.	1991	47.3	-4.0	1.91	0.76
Nov.	1991	28.1	-7.1	1.13	0.64
Dec.	1991	30.7	7.0	0.07	-0.36
Jan.	1992	29.4	11.8	1.19	0.88
Feb.	1992	32.8	9.0	0.80	0.34
Mar.	1992	40.0	8.0	2.05	0.97
Apr.	1992	45.6	-1.0	.00	-2.20
May	1992	60.1	2.0	0.82	-1.85
June	1992	64.3	-3.7	4.95	1.67
July	1992	66.2	-9.0	6.16	4.07
Aug.	1992	65.3	-8.3	1.77	-0.08
Bear Butte Valley (Ft. Meade-Meade County Reporting Station)**					
Aug.	1991	73.9	2.2	1.27	-0.45
Sept.	1991	61.9	0.3	0.69	-0.50
Oct.	1991	47.7	-3.2	1.25	0.21
Nov.	1991	33.1	-2.8	1.32	0.62
Dec.	1991	33.7	5.6	0.00	-0.56
Jan.	1992	35.9	13.1	0.16	-0.31
Feb.	1992	37.2	9.3	0.34	-0.38
Mar.	1992	41.7	8.1	2.16	1.14
Apr.	1992	47.4	1.9	2.18	-0.23
May	1992	59.0	2.6	1.83	-1.48
June	1992	63.2	-2.6	3.88	0.07
July	1992	65.7	-7.3	2.64	0.41
Plainview (Meade County Reporting Point)***					
Aug.	1991	75.8	1.7	1.00	-0.25
Sept.	1991	63.3	1.7	0.63	-0.36
Oct.	1991	47.1	-0.5	0.24	-0.85
Nov.	1991	28.4	-5.1	0.63	0.17
Dec.	1991	30.2	9.7	0.05	-0.26
Jan.	1992	30.1	11.1	0.52	0.28
Feb.	1992	32.7	8.6	0.23	-0.26
Mar.	1992	41.0	7.6	0.81	-0.38
Apr.	1992	45.8	0	0.29	-1.61
May	1992	61.2	3.2	1.42	-1.28
June	1992	65.4	-2.9	5.27	1.87
July	1992	63.0	-13.1	4.66	3.34

*Average temperatures and precipitation obtained from NOAA Climatological Data from reporting station nearest the experimental sites. Temperatures are reported in degrees Fahrenheit and precipitation in inches.

**Departures from normal are based on records for the period 1951-80(30 Yrs).

***Departures from normal are based on records for the period 1975-91(14 Yrs).

TABLE 1. Continued

Month & Year	Average Temperature*	Departure from Normal	Total Precipitation*	Departure from Normal
Wasta (East Pennington & Custer County Reporting Station)**				
Aug. 1991	74.4	1.1	1.96	0.45
Sept. 1991	62.0	-2.0	1.58	0.52
Oct. 1991	46.5	-3.9	1.43	0.51
Nov. 1991	30.3	-4.8	0.89	0.40
Dec. 1991	30.7	6.0	0.08	-0.30
Jan. 1992	30.7	10.9	0.35	0.00
Feb. 1992	34.3	8.3	0.52	0.08
Mar. 1992	42.0	7.9	1.34	0.49
Apr. 1992	48.2	1.2	0.68	-1.23
May 1992	60.3	2.2	2.33	-0.18
June 1992	65.1	-2.6	3.84	0.71
July 1992	66.4	-8.5	3.94	1.89
Aug. 1992	67.5	-5.8	0.73	-1.06
Bison (Perkins County Reporting Station)****				
Aug. 1991	72.3	3.3	0.16	-1.59
Sept. 1991	61.4	2.4	0.25	-0.96
Oct. 1991	46.0	-0.7	1.69	0.87
Nov. 1991	27.7	-3.0	0.34	-0.17
Dec. 1991	29.5	10.2	0.00	-0.39
Jan. 1992	31.4	15.3	0.05	-0.31
Feb. 1992	33.5	11.7	0.07	-0.45
Mar. 1992	39.7	8.5	0.40	-0.43
Apr. 1992	45.8	1.5	0.99	-0.86
May 1992	59.4	3.7	2.73	0.17
June 1992	63.5	-2.2	5.50	2.22
July 1992	63.4	-8.9	5.25	3.05
Kirley (Stanley County Reporting Station)+++				
Aug. 1991	75.4	-1.7	1.00	-0.85
Sept. 1991	62.8	1.0	0.38	-0.98
Oct. 1991	47.1	-2.7	1.44	0.45
Nov. 1991	27.9	-4.4	0.23	-0.20
Dec. 1991	29.5	9.0	Tr	-0.50
Jan. 1992	28.6	11.9	0.74	0.39
Feb. 1992	31.0	8.0	1.22	0.64
Mar. 1992	40.1	6.7	0.95	-0.06
Apr. 1992	45.6	-1.6	0.19	-1.53
May 1992	61.4	2.8	1.38	-1.24
June 1992	64.8	-2.3	2.80	-0.20
July 1992	65.2	-9.4	6.29	4.32
Aug. 1992	65.9	-11.2	2.59	0.74

*Average temperatures and precipitation obtained from NOAA Climatological Data from reporting station nearest the experimental sites. Temperatures are reported in degrees Fahrenheit and precipitation in inches.

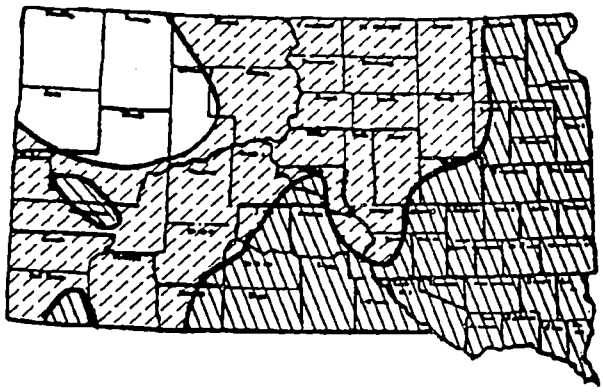
**Departures from normal are based on records for the period 1951-80(30 Yrs).

****Departures are based on records for 1970-91(21 Yrs) at specific location.

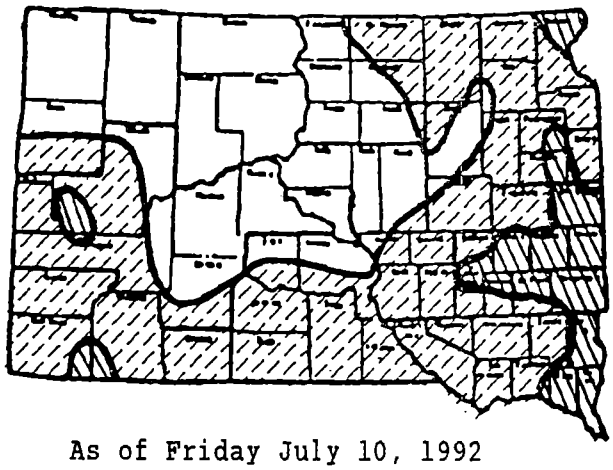
+++Departures from normal are based on records for the period 1971-1991.

TABLE 2. Topsoil Moisture Conditions During Growing Season, April-September 1992. (Crop and Livestock Reporting Service-USDA)

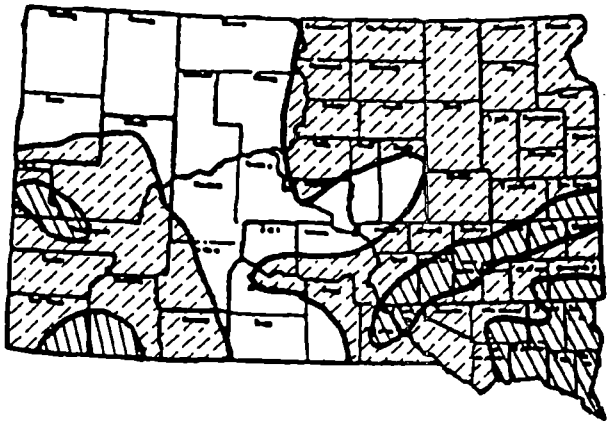
As of Friday April 17, 1992



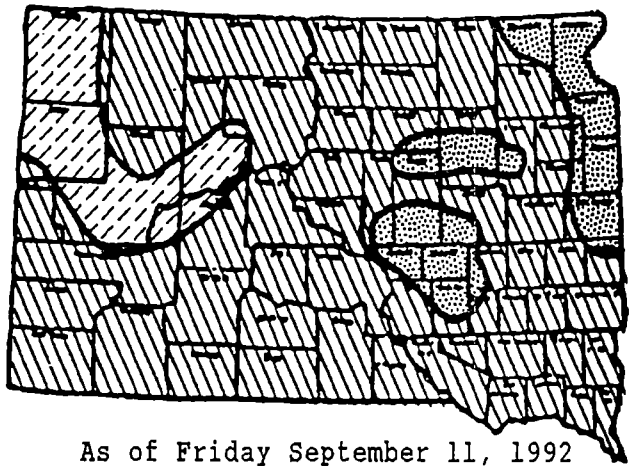
As of Friday May 15, 1992



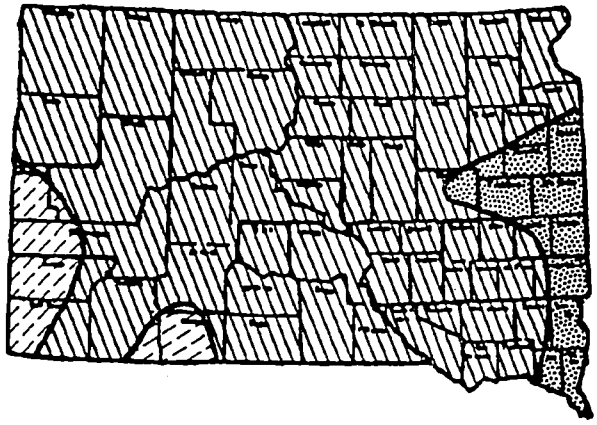
As of Friday June 12, 1992



As of Friday July 10, 1992



As of Friday August 14, 1992



As of Friday September 11, 1992

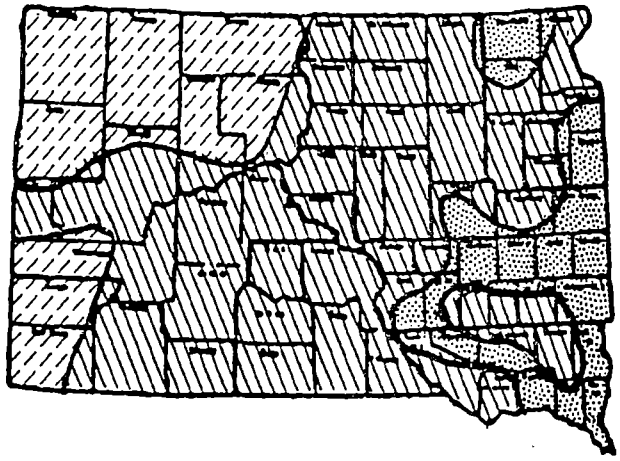


TABLE 3. Weather Data - Date of Critical Temperatures and Total Usable Precipitation in Counties with Experimental Plots, (1991-1992).

Location	Date of Temperature*		Total Usable Moisture**	
	Fall-First	Spring-Last	Aug 91-July 92	April 92-July 92
Bennett County (Martin)	Sep. 18 (26°)	May 26 (22°)	12.91	4.67
Fall River County (Oelrichs)	Sep. 18 (26°)	Apr 26 (22°)	11.24	6.50
Harding County (Ralph)	Sep. 18 (23°)	May 27 (27°)	7.57	6.32
Jones County (Murdo)	Sep. 17 (25°)	Apr 21 (23°)	15.07	7.94
Meade County (Ft. Meade)	Sep. 18 (27°)	Apr 26 (28°)	10.32	7.08
Meade County (Plainview)	Sep. 18 (26°)	May 26 (27°)	9.38	8.22
Pennington County (Rapid City AP)	Sep. 18 (27°)	May 26 (28°)	7.20	5.43
Pennington County (Wasta)	Sep. 18 (27°)	May 26 (28°)	10.61	6.86
Perkins County (Bison)	Sep. 18 (26°)	Apr 22 (28°)	12.22	10.70
Stanley County (Kirley)	Sep. 19 (23°)	May 28 (28°)	10.64	7.48

*First 28 degree temperature in Fall or last 28 degree temperature in Spring reported in degrees Fahrenheit.

**Sum of all precipitation where amounts were greater than 0.25 inch or totaled 0.25 inches in two contiguous days.

SMALL GRAIN VARIETY TRIALS

Objective: To observe and compare standard small grain varieties and experimental lines for winter hardiness, grain yield, grain quality, disease resistance, insect resistance, and other characteristics for area adaptability.

Hard Red Winter Wheat

Trials and demonstrations were located in Bennett, Fall River, Harding, Meade, Pennington, Perkins, and Stanley Counties. The trial plots were seeded with a deep furrow seeder with fertilizer attachment. The seeding rate was 60 pounds per acre.

The plots were harvested with a Hege Model 125B self-propelled plot combine. Machine harvested plots contained a minimum of 125 square feet per sample. All samples were weighed for plot yield and bushel weight at the harvest site.

Bennett County

The winter wheat variety trial in Bennett county was seeded into fallow soil with a deep furrow seeder on September 16. Surface soil condition was excellent with subsoil moisture present from the seeding depth of 2.5 inches to 36 inches. Soil temperature at 3 inches was 59 degrees fahrenheit. Rain showers were received six days before seeding resulting in good germination and wheat stands of 84-90%. Precipitation during the growing season was below normal until July. Winterkill was heavy in some varieties as a result of above normal winter temperatures and droughty conditions. Growing conditions during the spring resulted in heavy tillering. Heading of the tillers occurred late and they were able to escape a killing frost in late May. The frost damaged most of the early heads. Yield and other data are listed in Table 4.

Fall River County

The winter wheat variety trial in Fall River county near Oelrichs was seeded in fallow soil with a deep furrow seeder on September 14. Subsoil moisture was limited, but surface soil moisture was adequate for germination. Precipitation was near normal from August through February. However, from March through July precipitation was above normal. The cool temperatures of June and July provided excellent conditions for grain production. The temprature-moisture combination was favorable for the production of starch resulting in grain of lower protein content. The late May killing frost did not affect this trial. The data are listed in Table 5.

TABLE 4. Hard Red Winter Wheat Variety Trial - Bennett County(Martin), 1990-92.

Variety	Percent Stand 11/91	Percent Stand 3/92	Height Inches	Maturity (0-7)*	Percent Protein**	Test Wt (Lbs/Bu)	Grain Yield-Bu/A 1992	Grain Yield-Bu/A (3 yr av)
Norstar	85	86	34	Late 7	15.1	54.8	34.8	34.9
Quantum 549	90	88	25	Medium 3	15.1	53.3	26.5	46.8
SD 87143	85	71	25	Medium 3	16.5	53.6	24.4	--
Roughrider	85	90	27	Med-Late 6	15.6	54.3	23.8	35.2
Agassiz	88	53	35	Med-Late 6	14.6	53.6	22.0	34.1
Quantum 562	88	83	22	Medium 2	16.4	50.4	21.7	46.1
Scout 66	89	70	28	Early 2	15.6	52.8	21.6	39.4
Rose	89	81	26	Med-Late 5	14.7	52.1	19.7	37.9
SD 88137	85	68	27	--	18.6	51.6	19.0	--
Redland	89	58	25	Medium 3	13.8	49.8	17.8	--
Sage	90	69	24	Early 2	16.2	52.6	17.6	38.4
Seward	84	64	31	Med-Late 5	13.9	50.3	17.3	39.5
SD 88119	84	16	25	Medium 3	14.8	50.6	17.2	--
Siouxland	88	19	26	Early 1	13.8	44.7	17.1	43.7
NE 87615	88	38	22	--	18.1	47.7	16.6	--
SD 88191	90	9	25	Early 3	13.9	48.9	16.2	--
SD 88231	86	23	27	Early 2	15.1	51.2	16.0	--
NE 87612	88	18	22	--	15.2	46.6	15.7	--
NE 86501	84	11	26	--	16.1	49.4	15.0	--
SD 89333	89	35	27	--	15.3	50.1	14.5	--
SD 88185	86	13	24	Medium 3	15.8	52.8	14.0	--
Abilene	89	58	21	Medium 2	15.7	52.0	13.5	42.3
Arapahoe	88	26	26	Medium 2	14.0	49.7	13.4	43.4
Brule	89	16	27	Medium 3	14.0	47.9	13.4	42.2
Siouxland 89	88	14	29	Early 2	14.2	47.8	13.4	41.5
Dawn	90	10	25	Medium 4	14.7	46.0	12.6	39.0
Centura	86	28	25	Early 3	15.1	48.6	12.5	41.0
Karl	90	18	21	Early 0	16.8	45.9	11.9	44.3
Rawhide	90	44	23	Medium 2	16.2	44.3	11.6	--
Thunderbird	89	10	23	Medium 4	16.3	49.7	8.3	37.0
TAM 200	89	4	23	Early 2	15.1	38.1	7.3	33.0
TAM 107	89	18	21	Early 0	15.8	45.4	7.1	38.8
Rio-Blanco	90	3	20	Medium 3	13.9	35.9	6.7	--
Lamar	89	7	26	Medium 2	14.2	49.3	6.5	--
KS 87H6	90	4	24	--	16.2	43.4	4.5	--
Bronco	89	5	24	Medium 3	--	46.8	1.7	--

LSD(5%) - 6.4 Bu/A C.V. - 32.4% Mean - 15.3

*Maturity rating and days headed after earliest varieties have headed.
**Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Seeded September 16, 1991 and harvested August 5, 1992. Starter fertilizer was applied at 12-41-0 pounds per acre. Weeds were controlled by an application of Ally at 1/10 ounce per acre plus 2,4-D at 1/2 pound per acre. Grain yield significantly reduced by after heading frost on May 24, 1992.

TABLE 5. Hard Red Winter Wheat Variety Trial - Fall River County (Oelrichs), 1990-92.

Variety	Percent Stand 11/91	Percent Stand 5/92	Height Inches	Date of Heading	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bu/A 1992	Grain Yield-Bu/A (3 yr av)
Quantum 549	70	89	36	May 19	9.1	57.7	77.2	69.9
TAM 200	58	87	27	May 18	11.3	59.3	76.8	65.2
Centura	66	88	34	May 21	10.5	58.5	72.0	64.9
Dawn	74	86	33	May 20	10.4	59.0	69.0	62.4
SD 89119	44	88	35	May 20	12.2	58.7	68.8	--
SD 88191	61	85	30	May 21	10.3	57.8	68.4	--
Siouxland	65	86	37	May 20	11.2	56.5	68.0	63.7
Norstar	53	86	50	May 23	9.3	58.6	67.9	51.5
Longhorn	65	90	33	May 20	13.1	62.0	67.6	--
TAM 107	64	88	31	May 17	12.4	57.1	67.2	63.9
Siouxland 89	61	87	38	May 21	10.0	55.9	67.2	63.5
Quantum 562	84	90	32	May 19	10.6	57.8	66.8	64.5
SD 88231	41	84	35	May 17	10.9	58.6	66.8	--
Agassiz	68	84	46	May 23	9.7	57.9	66.6	57.1
Roughrider	56	88	42	May 23	10.2	59.1	66.5	53.7
NE 87612	53	84	32	May 19	13.1	57.1	66.4	--
SD 89333	68	89	35	May 17	8.6	58.1	66.3	--
Seward	55	82	41	May 23	9.6	56.9	66.3	58.3
Rose	64	87	38	May 22	9.4	58.6	65.8	63.3
Lamar	62	85	33	May 20	10.3	57.8	65.3	--
Bronco	78	89	30	May 19	10.5	57.8	65.1	--
SD 88185	35	84	34	May 20	9.9	57.8	64.6	--
SD 87143	58	84	36	May 21	10.4	58.3	63.4	63.6
NE 86501	41	83	33	May 20	13.1	58.2	62.1	--
Thunderbird	70	88	32	May 18	9.7	59.7	60.6	58.0
Scout 66	71	88	36	May 17	9.3	58.1	60.4	57.5
SD 88137	73	83	39	May 20	11.1	57.7	60.4	--
Arapahoe	75	87	35	May 20	11.4	57.2	60.3	62.6
NE 87615	73	87	29	May 18	11.7	58.0	59.8	--
Brule	60	86	36	May 20	10.2	57.0	59.0	60.8
Sage	75	89	35	May 18	10.9	57.5	58.2	58.7
Rio-Blanco	39	88	26	May 19	11.2	58.8	57.8	--
Rawhide	66	89	34	May 19	9.8	57.1	57.0	--
KS 87H6	64	88	30	May 19	12.6	58.4	56.9	56.9
Redland	71	87	35	May 21	9.5	57.2	55.4	63.0
Abilene	71	87	27	May 19	11.3	60.2	52.7	60.9
Karl	76	89	30	May 17	14.1	56.8	40.0	52.9

LSD(5%) - 8.4 Bu/A C.V. - 9.1% Mean - 63.8

**Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Seeded September 14, 1991 and harvested July 24, 1992. Weeds were controlled with Ally at 1/10 ounce per acre.

Harding County

The Harding County trial was seeded on September 18, 1991. Soil moisture was absent to depth of seeding but a soil moisture probe could be inserted to a depth of 30 inches. Rainfall had been below normal from July through September of 1991, but slightly above normal during October and November. Stand notes taken in mid-November indicated 85%-90% emergence. Varieties which produced good topgrowth were heavily grazed by wildlife. Spring stands were quite variable in mid-April but improved with time. Good growing conditions during May and June resulted in a large number of tillers. Those tillers produced large heads. Adequate moisture and cool conditions resulted in high yield of excellent quality grain. The yield and other data are reported in Table 6.

Meade County
(Bear Butte Valley)

Winter wheat varieties in Bear Butte Valley were seeded on September 13, 1991. The soil was loose but contained good moisture at seeding depth. Moisture had been limited through the summer but the area had received rainshowers the week before seeding. Precipitation was limited during the remainder of the fall and winter. Fall emergence was only 68% to 89% and was quite uneven. Conditions in the spring were warm and dry resulting in slow initial growth. Rainshowers beginning in mid- to late-May resulted in good tillering and growth. The late spring cool temperatures with near normal precipitation resulted in good growth but the plants ran out of moisture during the kernel filling stage. Earlier maturing varieties generally had lower protein content and higher test weight than did the later maturing varieties. The trial results are reported in Table 7.

Meade County
(Plainview)

The winter wheat variety trial at Plainview was seeded on September 13. The soil had some moisture at seeding depth but none in the subsoil. Germination and emergence was very limited. Observations made in mid-November indicated that stands were only 3% to 28% of that expected. Spring stand observations in mid-April indicated only 21% to 64% of the seeds germinated or produced plants that survived the winter. Growing conditions improved in late May with cool temperatures and rainshowers. The early maturing varieties were damaged by a killing frost on May 26. For that reason the later maturing varieties had higher yields and higher test weights. Data are given in Table 8.

TABLE 6. Hard Red Winter Wheat Variety Trial-Harding County(Ralph), 1989-90,1992

Variety	Percent Stand 11/91	Percent Stand 4/92	Height Inches	Date of Heading	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bu/A 1992	Grain Yield-Bu/A (3 yr av)
Norstar	86	81	42	June 7	9.5	62.5	69.6	48.7
Quantum 562	88	83	27	June 3	12.4	60.6	65.4	48.0
Roughrider	89	86	39	June 7	10.2	62.1	63.6	45.0
Agassiz	85	79	42	June 7	9.7	62.5	62.3	49.9
Quantum 549	87	88	29	June 3	10.1	60.8	61.4	--
Seward	88	75	33	June 7	9.2	60.2	60.4	44.6
SD 88191	88	70	25	June 5	10.7	62.0	59.4	--
Rose	88	82	32	June 6	13.2	63.1	57.4	43.6
SD 87143	88	86	29	June 5	11.9	60.7	56.8	--
Dawn	89	66	29	June 4	12.1	62.3	56.7	39.9
Brule	85	76	30	June 5	10.8	59.5	55.6	42.2
SD 89333	87	77	32	June 2	12.7	60.6	55.4	--
Arapahoe	88	87	29	June 5	10.5	59.6	55.0	41.7
Siouxland 89	88	81	32	June 4	11.6	59.3	54.6	--
Bronco	87	60	26	June 4	11.5	60.2	53.4	--
SD 88185	84	54	30	June 4	10.6	61.8	53.3	--
Lamar	88	51	31	June 5	11.6	61.3	53.2	--
Centura	89	81	30	June 4	11.8	60.1	52.5	39.8
Colt	83	71	25	June 5	11.5	62.2	52.4	--
Rawhide	88	78	28	June 5	11.2	59.6	52.0	--
NE 87612	87	83	28	June 3	11.5	59.4	51.4	--
SD 89119	90	79	29	June 4	12.5	60.4	51.1	--
Sage	85	78	31	June 4	13.1	59.8	50.8	39.1
SD 88231	88	81	31	June 2	11.9	60.4	50.0	--
Abilene	90	76	27	June 4	11.3	62.0	49.7	40.2
Redland	89	84	28	June 5	12.4	59.2	48.7	40.6
NE 87615	89	77	27	June 4	13.2	59.6	48.6	--
Siouxland	90	84	33	June 4	11.1	59.6	48.6	42.7
Thunderbird	90	67	27	June 3	13.1	60.6	48.3	38.8
NE 86501	84	76	27	June 2	13.2	59.5	44.8	--
KS 87H6	89	73	26	June 2	13.9	60.3	43.6	--
Karl	87	63	26	June 2	13.9	60.0	41.6	--
TAM 107	89	75	25	June 2	12.9	58.4	41.2	34.9
Scout 66	90	83	32	June 2	13.8	59.3	39.8	33.7
TAM 200	89	38	24	June 5	13.0	62.0	39.4	30.2
Rio-Blanco	85	29	23	June 3	13.2	61.0	33.8	--

LSD(5%)- 12.5 Bu/Acre C.V.- 16.6% Mean - 52.3

*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Seeded September 18, 1991 and harvested August 10, 1992. Fertilizer was applied for an anticipated yield of 37 bushels per acre. Weeds were controlled by Ally at 1/10 oz/A. plus 2,4-D at 1/2 lb/A., applied in mid-May.

TABLE 7. Hard Red Winter Wheat Variety Trial - Meade County(Bear Butte), 1990-92.

Variety	Percent Stand 11/91	Percent Stand 4/92	Height Inches	Date of Heading	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bu/A 1992	Grain Yield-Bu/A (3 yr av)
Abilene	84	86	26	May 22	14.2	60.1	50.9	44.3
TAM 107	85	82	25	May 19	13.4	58.4	49.0	46.0
TAM 200	86	68	27	May 22	12.5	60.8	47.4	40.3
NE 87612	83	83	28	May 23	13.9	55.9	47.0	--
SD 89119	84	82	30	May 25	13.0	58.4	46.6	--
Quantum 562	86	84	29	May 22	13.7	57.0	46.1	42.0
NE 87615	86	89	26	May 21	14.1	57.3	45.6	--
Centura	84	84	34	May 23	14.2	58.0	45.3	40.3
Dawn	86	78	30	May 22	13.4	58.2	45.0	38.0
Quantum 549	76	84	30	May 23	13.7	55.3	44.6	39.9
Siouxland 89	84	78	34	May 23	13.5	57.3	43.9	39.3
SD 87143	84	79	31	May 23	14.5	56.2	43.8	42.5
Scout 66	89	86	36	May 20	14.9	58.9	43.6	40.2
Rawhide	83	86	30	May 22	14.2	56.2	43.6	--
SD 89333	78	79	31	May 21	--	57.6	43.4	--
SD 88191	84	81	27	May 28	14.6	56.0	43.3	--
Brule	82	78	31	May 23	13.2	56.9	42.7	39.7
Redland	88	85	34	May 26	14.7	56.2	42.5	41.0
SD 88231	70	72	32	May 22	14.2	57.3	42.3	--
Thunderbird	**86**	**75**	**30**	**May 22**	14.2	58.5	42.2	39.9
Siouxland	82	81	34	May 23	13.6	56.4	42.2	40.9
KS 87H6	86	76	27	May 21	14.4	57.2	42.0	--
Arapahoe	86	86	29	May 22	15.7	56.0	41.9	43.5
SD 88137	80	83	34	May 25	16.0	57.2	41.8	--
Bronco	88	71	28	May 22	13.3	58.3	40.3	--
SD 88185	81	71	29	May 23	15.2	56.3	39.7	--
Sage	83	84	30	May 21	15.1	58.9	38.3	41.1
Lamar	84	77	32	May 26	14.6	56.5	36.4	--
Rio-Blanco	84	74	27	May 22	16.0	57.5	34.9	--
Karl	87	82	27	May 19	15.9	54.9	33.9	43.7
NE 86501	70	76	30	May 23	15.1	54.8	33.6	--
Seward	78	83	34	June 3	15.5	51.9	32.5	33.5
Norstar	84	84	36	June 4	16.0	54.1	29.7	24.4
Agassiz	77	83	41	June 1	16.3	54.0	27.2	28.2
Rose	82	76	33	June 1	16.4	53.1	27.0	34.8
Roughrider	81	81	37	June 1	17.5	52.5	25.2	27.7

LSD(5%)- 6.36 Bu/Acre C.V.- 10.8% Mean - 40.7

*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Seeded September 13, 1991 and harvested July 20, 1992. Fertilizer was applied for an anticipated yield of forty bushels per acre. Weeds were controlled by Ally at 1/10 oz/A. and 2,4-D plus 1/2 lb/A. applied in mid-May.

TABLE 8. Hard Red Winter Wheat Variety Trial - Meade County(Plainview), 1990-92.

Variety	Percent Stand 11/91	4/92	Height Inches	Date of Heading	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bu/A 1992	(3 yr av)
Rose	11	64	32	June 6	11.8	61.1	47.4	38.0
Arapahoe	14	61	29	June 5	12.9	57.8	44.9	41.0
Seward	8	36	28	June 7	10.8	57.8	44.2	36.9
Redland	17	51	25	June 5	13.4	57.3	41.2	39.0
Agassiz	4	43	27	June 9	13.1	58.6	39.3	29.3
Quantum 562	33	41	23	June 4	12.9	57.0	35.9	--
Roughrider	18	55	31	June 7	12.3	58.4	34.0	28.8
Rawhide	23	54	24	June 4	12.5	57.0	32.1	--
Bronco	3	45	26	June 5	12.4	56.6	31.9	35.9
Quantum 549	23	43	28	June 5	13.3	55.3	31.2	--
Siouxland	12	41	28	June 5	12.1	55.9	30.7	36.3
Siouxland 89	23	35	27	June 5	12.5	56.3	30.5	--
Brule	10	28	27	June 5	11.1	56.1	29.7	31.0
Thunderbird	17	46	23	June 4	13.6	57.9	29.1	32.0
Centura	8	61	26	June 5	13.4	57.1	28.4	32.4
Sage	29	51	23	June 5	13.6	56.8	24.4	30.7
Scout 66	28	48	28	June 5	12.7	56.8	23.8	31.0
Dawn	6	36	28	June 5	12.8	58.0	23.2	33.5
Abilene	6	49	22	June 5	14.1	57.3	22.8	32.3
TAM 107	11	50	20	June 4	12.6	51.7	18.2	28.8
TAM 200	12	21	23	June 5	12.9	55.9	7.3	27.0

LSD(5%) - 11.0 Bu/A C.V. - N/A Mean - 24.1

*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Seeded September 13, 1991 and harvested August 10, 1992. Fertilizer was applied for an anticipated yield of forty bushels per acre. Weeds were controlled by Ally at 1/10 oz/A. plus 2,4-D at 1/2 lb/A., applied in mid-May.

Pennington County

The winter wheat variety trial at Wall was seeded on September 16. The soil surface was dry but contained moisture at seeding depth. Several showers were received in the week preceding seeding. Fall emergence ranged from 82% to 89%. Moisture was in limited supply throughout the winter and spring. Temperatures, much above normal from December through March, moderated during April and May, becoming much below normal by July. The cool temperatures coupled with the rainfall pattern resulted in good vegetative production. Grain yields were generally highest from the later heading varieties. Those varieties were able to take advantage of the moisture which fell during late June and July. Grain quality was below normal with test weights being reduced by rainy conditions after maturity. Protein content was low as the result of good starch production during the end of the growth cycle. Data are listed in Table 9.

TABLE 9. Hard Red Winter Wheat Variety Trial - Pennington County(Wall), 1990-92.

Variety	Percent Stand 11/91	Percent Stand 4/92	Height Inches	Date of Heading	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bu/A 1992	Grain Yield-Bu/A (3 yr av)
SD 88191	85	86	31	May 26	9.7	57.4	72.7	--
SD 89119	86	82	37	May 24	9.3	56.7	72.7	--
NE 87612	88	85	32	May 20	8.9	56.9	72.6	--
TAM 107	86	86	29	May 17	9.3	56.8	72.0	58.9
Norstar	87	87	47	May 26	8.3	55.0	71.8	53.0
NE 86501	86	86	32	May 20	10.2	56.7	66.8	--
Siouxland 89	87	82	38	May 20	9.3	54.2	66.5	58.5
SD 88231	82	80	35	May 17	9.7	58.2	66.1	--
Lamar	87	84	34	May 20	9.2	56.1	66.0	--
NE 87615	87	88	27	May 18	9.4	57.6	65.9	--
SD 88185	84	80	30	May 21	9.5	57.3	65.2	--
SD 87143	85	76	33	May 23	10.5	56.8	64.8	58.5
Rose	89	87	38	May 26	9.7	57.8	64.7	58.8
Seward	88	86	40	May 26	8.3	55.1	64.6	53.9
Redland	88	87	35	May 21	8.6	56.0	64.3	56.5
Thunderbird	86	83	32	May 19	11.2	57.7	64.3	53.5
Agassiz	87	86	45	May 26	9.1	54.3	64.1	54.4
KS 87H6	82	70	29	May 20	11.2	57.1	63.1	--
Centura	81	79	34	May 19	9.4	57.8	63.0	56.8
Quantum 549	86	86	34	May 19	9.0	56.8	62.1	57.6
TAM 200	87	76	28	May 20	9.3	58.8	61.2	54.4
Scout 66	89	87	36	May 17	10.6	57.6	61.2	53.7
Siouxland	85	84	34	May 19	9.9	55.0	61.2	55.3
SD 89333	87	89	32	May 17	9.1	57.5	60.8	--
SD 88137	88	88	38	May 22	8.8	56.0	60.4	--
Bronco	87	86	31	May 19	8.3	56.7	59.9	--
Arapahoe	86	81	33	May 20	9.5	55.3	59.4	54.9
Rawhide	81	79	32	May 18	10.6	56.2	59.3	--
Roughrider	88	90	40	May 26	8.9	57.0	58.0	48.9
Quantum 562	87	86	32	May 19	9.6	56.4	57.4	55.4
Sage	86	88	33	May 18	11.1	56.2	57.3	51.9
Brule	84	78	35	May 20	7.6	55.4	56.6	52.7
Dawn	86	81	32	May 19	9.2	58.0	56.4	51.7
Abilene	86	84	28	May 19	10.2	59.5	55.2	55.9
Rio-Blanco	87	78	27	May 21	11.0	58.7	54.1	--
Karl	89	89	28	May 17	11.7	56.2	54.0	51.7

LSD(5%) - 12.2 Bu/A C.V. - 13.4% Mean - 62.9

*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Seeded September 16, 1991 and harvested July 24, 1992. Test weights were reduced as a result of rain and moist conditions after maturity. Starter fertilizer was applied at 15-50-0 #/A. Weeds were controlled with Ally at 1/10 oz/A plus 2,4-D at 1/2 lb/A.

Perkins County

The winter wheat variety trial at Bison was seeded on September 17. Soil moisture was limited at the surface, was fair at seeding depth, and was measurable to a depth of 36 inches. Fall germination was irregular and ranged from 83% to 89%. Precipitation was below normal from August through mid-May. Sporadic showers from mid-May through July coupled with below normal temperatures resulted in good yield for the late season varieties. Most of the late season varieties also have a high level of winter hardiness. The early heading varieties received some damage from the killing frost which occurred on May 27. The data are reported in Table 10.

Stanley County

The winter wheat varieties in Stanley county were comparable in that the same varieties were seeded in both conventional fallowed soil and in reduced tillage fallow. The plots were seeded on September 19, 1991. Soil moisture at seeding time was good in both fallow treatments as the result of a rainshower several days earlier. Fall emergence was good in both fallow treatments. Temperatures of December through March were considerably above normal. The warm conditions resulted in severe winterkill of those varieties with less than "good" winter survival. The surviving plants of the poor-fair winterhardy varieties were further damaged by a killing frost in late May when the plants were heading. The good-excellent winterhardy varieties did not head until June and were able to escape frost damage.

Air temperatures during June and July were below normal. Precipitation was above normal in late June and during July. The combination of precipitation and temperature resulted in good yield of grain by the winterhardy varieties. Quality of the grain varied because of late developing tillers with green kernels mixed with earlier maturing heads which were shattering at harvest. Data are reported in Tables 11 and 12.

TABLE 10. Hard Red Winter Wheat Variety Trial - Perkins County(Bison), 1990-92.

Variety	Percent Stand 11/91	Percent Stand 4/92	Height Inches	Date of Heading	Percent Protein*	Test Wt (Lbs/Bu)	Grain Yield-Bu/A 1992	Grain Yield-Bu/A (3 yr av)
Norstar	87	56	33	June 10	14.1	61.7	51.2	29.3
Roughrider	86	66	29	June 9	15.5	61.4	44.2	27.2
Seward	83	26	27	June 9	12.9	58.5	42.9	29.9
Quantum 549	89	31	25	June 6	14.0	60.5	40.5	31.0
Rose	89	61	24	June 8	16.2	62.0	37.7	29.4
Agassiz	83	10	35	June 9	14.6	61.6	37.1	26.4
Quantum 562	87	30	22	June 5	14.8	59.4	36.2	28.3
SD 88231	87	24	25	June 7	13.8	59.4	32.4	--
Abilene	89	49	20	June 5	14.8	60.0	31.8	28.9
SD 87143	87	49	24	June 6	14.5	59.2	31.0	30.6
Arapahoe	86	29	25	June 6	15.1	56.8	28.9	28.3
SD 89119	87	28	24	June 7	15.4	60.3	28.2	--
Scout 66	89	51	25	June 5	14.3	58.8	27.8	24.2
Thunderbird	87	50	22	June 5	15.5	59.5	27.7	24.8
Redland	87	24	23	June 7	13.7	58.4	27.1	26.0
Sage	88	20	27	June 6	15.0	57.0	27.0	24.8
NE 86501	86	31	23	June 5	14.9	58.3	26.5	--
NE 87612	88	19	24	June 6	14.3	57.8	25.9	--
SD 89333	88	22	26	June 5	14.1	58.9	25.9	--
Centura	88	13	26	June 7	13.1	57.6	25.5	27.4
NE 87615	86	35	23	June 7	15.7	56.0	24.5	--
Siouxland	89	20	27	June 6	14.6	55.4	24.2	22.9
SD 88185	86	19	25	June 7	14.2	58.5	23.6	--
Siouxland 89	87	9	28	June 6	15.8	55.4	23.2	24.7
Colt	84	6	24	June 6	15.0	57.2	22.9	--
Brule	86	9	27	June 8	13.3	57.1	22.8	24.2
Bennett	88	11	23	June 5	15.7	57.9	22.5	--
TAM 107	89	19	22	June 4	13.6	57.9	20.8	19.6
SD 88191	87	21	24	June 8	13.6	58.5	20.4	--
Lamar	87	4	26	June 8	13.3	58.3	18.8	--
Dawn	88	5	26	June 7	14.4	57.3	18.4	22.4
Rawhide	86	15	24	June 6	15.0	55.0	18.1	--
TAM 200	89	9	23	June 7	15.6	56.1	17.8	18.3
Rio-Blanco	89	9	21	June 7	14.9	57.1	16.5	--
Bronco	88	16	22	June 7	13.2	54.5	15.2	--
Karl	84	3	16	June 4	16.7	54.2	13.8	20.1

LSD(5%) - 8.4 Bu/A C.V.- 21.3% Mean - 27.4

*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Seeded September 17, 1991 and harvested August 12, 1992. Starter fertilizer was applied at 11-37-0 #/A. Weeds were controlled with Ally at 1/10 oz/A plus 2,4-D at 1/2 lb/A.

TABLE 11. Hard Red Winter Wheat Variety Trial (Conventional fallow) - Stanley County (Hayes), 1990,1992.

Variety	Height (Inches)	Maturity (0-7)*	Percent Protein**	Test Wt (Lbs/Bu)	Grain Yield-Bu/A 1992	Grain Yield-Bu/A (2 yr av)
Roughrider	Tall 38"	Med-Late 6	13.2	58.2	61.7	43.4
Seward	Tall 37"	Med-Late 5	11.7	52.5	57.2	37.4
Quantum 549	Medium 32"	Medium 3	14.2	55.7	50.4	--
Rose	Medium 34"	Med-Late 5	13.0	53.3	48.0	46.1
Arapahoe	Medium 30"	Medium 2	13.7	50.9	47.3	47.4
Redland	Medium 30"	Medium 3	12.2	49.2	43.4	44.2
Quantum 562	Medium 32"	Medium 2	14.1	53.9	41.8	43.7
Siouxland	Medium 32"	Early 1	12.3	43.2	37.0	31.9
Agassiz	Tall 39"	Med-Late 6	12.9	48.9	35.3	44.3
Scout 66	Medium 32"	Early 2	13.0	55.3	32.2	28.5
Longhorn	Medium 30"	Early 1	14.6	45.9	30.0	--
Siouxland 89	Medium 31"	Early 2	12.8	38.3	26.4	--
Sage	Medium 32"	Early 2	13.8	53.7	24.1	28.2
Karl	Short 30"	Early 0	14.2	48.9	23.3	--
Abilene	Short 28"	Medium 2	14.4	52.0	23.1	38.8
Rawhide	Short 30"	Medium 2	13.7	46.5	22.3	--
Thunderbird	Short 30"	Early 3	13.3	50.6	21.2	28.4
Centura	Medium 30"	Early 3	13.5	50.6	21.1	33.2
Dawn	Medium 30"	Medium 4	13.4	48.6	21.0	34.5
Bronco	Medium 31"	Medium 3	13.5	47.5	16.9	--
TAM 107	Short 27"	Early 0	13.4	47.8	14.4	22.0
TAM 200	Short 27"	Early 2	13.4	49.1	8.5	21.5
LSD(5%) - N. S.				Mean - 32.1		

*Maturity rating and days headed after earliest variety has headed.
**Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Seeded September 19, 1991 and harvested July 28,1992. Starter fertilizer was applied at 6 gallons per acre (7-27-0 #/A). Weeds were controlled with Ally at 1/10 oz/A. plus 2,4-D at 1/3 lb/A., applied on May 6, 1992.

TABLE 12. Hard Red Winter Wheat Variety Trial (Reduced tillage) - Stanley County (Hayes), 1990,1992.

Variety	Height (Inches)	Maturity (0-7)*	Percent Protein**	Test Wt (Lbs/Bu)	Grain Yield-Bu/A 1992	Grain Yield-Bu/A (2 yr av)
Roughrider	Tall 38"	Med-Late 6	12.7	56.8	52.4	40.3
Redland	Medium 30"	Medium 3	12.2	50.4	49.0	44.9
Rose	Medium 34"	Med-Late 5	13.5	54.0	48.9	48.1
Quantum 549	Medium 32"	Medium 3	13.5	51.1	48.3	--
Seward	Tall 37"	Med-Late 5	12.4	51.0	43.4	40.0
Quantum 562	Medium 32"	Medium 2	14.8	53.6	41.2	42.8
Arapahoe	Medium 30"	Medium 2	13.4	44.8	40.4	46.2
Agassiz	Tall 39"	Med-Late 6	13.7	46.1	35.5	--
Siouxland 89	Medium 31"	Early 2	13.0	40.9	35.2	35.8
Scout 66	Medium 32"	Early 2	16.1	54.2	33.8	32.3
Siouxland	Medium 32"	Early 1	12.2	38.4	32.9	33.2
Longhorn	Medium 30"	Early 1	14.8	45.7	31.7	--
Karl	Short 30"	Early 0	15.4	48.2	27.6	35.3
Abilene	Short 28"	Medium 2	13.0	52.9	26.9	37.1
Sage	Medium 32"	Early 2	14.9	47.7	24.9	29.0
Dawn	Medium 30"	Medium 4	13.2	49.6	24.2	33.4
Thunderbird	Short 30"	Early 3	14.6	45.0	22.9	30.6
Bronco	Medium 31"	Medium 3	12.7	46.7	22.6	--
Rawhide	Short 30"	Medium 2	15.2	42.7	21.5	--
Centura	Medium 30"	Early 3	13.8	49.3	18.3	--
TAM 107	Short 27"	Early 0	14.1	48.7	16.3	29.2
TAM 200	Short 27"	Early 2	13.4	41.6	16.1	27.8

LSD(5%) - N. S. Mean - 32.4

*Maturity rating and days headed after earliest variety has headed.
**Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Seeded September 19, 1991 and harvested July 28,1992. Starter fertilizer was applied at 6 gallons per acre (7-27-0 #/A). Weeds were controlled with Ally at 1/10 oz/A. plus 2,4-D at 1/3 lb/A., applied on May 6, 1992.

Hard Red Spring Wheat

Plots were seeded at five locations in 1992. All trials were seeded on fallow with a six row plot seeder having eight inch row spacing. Individual plots contained a minimum of 120 square feet with four replications per variety.

Seeding rate was controlled by prepackaging all seed. Fertilizer requirements were predetermined by soil test. Weeds were controlled by applying Ally at 0.1 oz/a and 2,4-D at 1/2 lb/A. Harvesting was accomplished with a self-propelled plot combine. Machine harvested plots contained a minimum of 100 square feet per sample. Grain yields and other data are reported in Tables 13 through 18.

Harding County

Spring wheat plots were seeded at Ralph on April 22. The soil was mellow and moist from recent spring rains. Germination and emergence was good resulting in uniform stands. Weather conditions were favorable for growth and resulted in plants with good height and well tillered. Grain yield averaged over 56 bushels per acre. The grain was of high quality with test weights of 59-63 pounds per bushel. The kernels were plump and contained a high content of starch. Protein content was low because of high starch content. Data are reported in Tables 13 and 14.

TABLE 13. Hard Red Spring Wheat Variety Trial - Harding County(Ralph), 1990-92.

Variety	Height (Inches)	Date of Heading	Percent Moisture	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre 1992	Grain Yield-Bu/Acre (3 yr av)
Krona	27	June 23	14.3	9.5	60.6	65.5	--
Prospect	29	June 23	14.4	9.3	61.8	62.5	44.7
Nordic	29	June 24	15.8	9.6	61.3	61.8	39.8
Vance	32	June 24	13.3	11.7	60.7	61.4	37.3
SD 8073	31	June 21	14.1	10.1	61.9	60.4	--
Stoa	34	June 23	14.7	11.6	60.7	60.4	40.9
N87-0306	27	June 20	13.3	9.9	62.2	59.2	--
SD 8072	33	June 21	14.2	9.4	62.6	58.5	--
Amidon	35	June 22	16.1	12.2	59.0	57.9	41.1
Bergen	26	June 20	13.0	11.8	61.8	57.5	--
SD 8074	32	June 19	14.0	12.0	61.5	57.4	--
2375	31	June 20	13.5	10.8	62.6	56.8	38.2
Grandin	31	June 21	14.7	10.7	62.2	56.1	37.9
Norm	29	June 21	13.9	10.6	61.3	55.9	--
2371	31	June 22	13.6	12.0	61.4	55.0	--
Guard	27	June 19	13.3	11.4	62.9	54.0	40.6
Dalen	28	June 20	14.1	11.5	63.2	53.8	--
SD 8070	32	June 20	13.8	9.8	62.8	53.3	--
Butte 86	32	June 20	13.3	12.6	62.2	52.5	41.0
Chris	38	June 23	14.3	11.7	61.2	51.1	34.2
Sharp	32	June 19	13.4	10.6	63.8	50.7	40.7
SD 3056	30	June 19	13.2	11.6	61.4	50.4	--
Gus	29	June 23	14.3	12.4	60.3	49.2	40.0
Hi-Line	26	June 19	13.4	13.9	61.2	48.0	--
SD 3015	30	June 20	12.9	11.0	62.3	45.4	--

LSD(5%) - 7.0 Bu/A C.V. - 8.7% Mean - 56.6

*Percent protein was determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 22 and harvested August 17, 1992. Starter fertilizer was applied at 10.4 gallons per acre (12-41-0 #/A). Weeds were controlled with Ally at 1/10 oz/A. plus 2,4-D at 1/2 lb/A..

TABLE 14. Hard Red Spring Wheat Advanced Line Yield Trial - Harding County (Ralph), 1990-92.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre 1992	Grain Yield-Bu/Acre (3 yr av)
SD 0005	31	June 26	10.9	56.4	60.7	--
SD 0006	33	June 26	9.7	56.8	57.2	--
SD 8073	36	June 25	12.1	59.5	57.0	38.2
SD 0015	30	June 24	12.8	61.1	56.5	--
SD 0007	31	June 24	11.4	58.9	56.0	--
SD 0014	30	June 25	10.3	59.8	55.4	--
SD 0008	32	June 25	11.3	59.8	55.2	--
SD 0018	28	June 22	11.6	60.6	55.1	--
SD 0002	35	June 23	11.5	61.3	54.7	--
SD 8074	36	June 23	10.3	61.2	53.3	40.6
SD 0004	34	June 24	10.5	60.8	53.2	--
SD 0017	31	June 24	10.8	60.5	52.8	--
SD 0003	33	June 23	10.8	60.5	52.8	--
SD 8072	34	June 23	11.8	61.1	52.7	37.5
SD 0021	33	June 25	10.8	60.6	51.9	--
SD 3120	33	June 22	11.2	59.9	51.8	--
2375	31	June 23	11.4	62.5	51.7	39.6
SD 0010	32	June 24	11.9	60.2	50.7	--
SD 0009	29	June 25	11.4	58.2	50.6	--
Sharp	34	June 23	11.7	64.0	50.5	37.5
Prospect	30	June 22	9.5	62.2	50.5	37.1
SD 0016	31	June 24	10.6	58.7	50.4	--
Butte 86	33	June 24	11.7	62.9	50.0	39.3
SD 8070	34	June 23	11.8	59.1	49.7	39.4
SD 3116	33	June 22	9.7	63.0	48.5	--
SD 3056	33	June 24	14.6	63.3	47.5	36.4
SD 0020	32	June 24	11.6	61.3	47.3	--
SD 0012	31	June 24	12.3	59.5	47.3	--
SD 0011	32	June 23	11.8	58.7	47.2	--
SD 3105	32	June 25	12.4	62.6	46.5	--
SD 3113	36	June 23	11.0	64.9	46.2	--
SD 0001	28	June 24	13.2	58.9	45.7	--
SD 0013	31	June 23	12.4	61.6	44.6	--
Chris	38	June 24	11.8	60.5	44.2	31.4
SD 3122	32	June 24	12.9	62.2	43.3	--
SD 0019	35	June 24	12.5	60.5	43.2	--

LSD(5%) - 5.9 Bu/A C.V. - 6.7% Mean - 50.9

*Percent protein was determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 22 and harvested August 17, 1992. Starter fertilizer was applied at 10.4 gallons per acre (12-41-0 #/A). Weeds were controlled with Ally at 1/10 oz/A. plus 2,4-D at 1/2 lb/A..

Meade County
(Bear Butte Valley)

The spring wheat trials at Bear Butte were seeded on April 9. The soil was dry to seeding depth but contained moisture to a depth of 24 inches. Rain showers during April and May were below normal but were received at critical times. The plants produced numerous tillers with a potential for a high yield. Moisture became critically short during the period when the kernels were filling. The result was small unfilled wrinkled seed with low starch content, high protein content, and low test weight. The data are reported in Table 15.

TABLE 15. Hard Red Spring Wheat Variety Trial - Meade County(Bear Butte Valley), 1990-92.

Variety	Height (Inches)	Date of Heading	Percent Moisture	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre 1992	Grain Yield-Bu/Acre (3 yr av)
Bergen	28	June 18	10.4	16.4	48.7	31.8	26.4
Norm	30	June 17	10.5	16.1	49.9	29.7	25.0
Sharp	33	June 15	10.5	16.0	50.4	29.4	26.8
N87-0306	29	June 16	10.2	17.0	47.2	29.3	--
Butte 86	34	June 16	9.6	16.9	48.1	28.6	25.0
SD 8074	32	June 15	9.9	16.9	46.4	27.9	--
Guard	29	June 16	10.9	14.6	49.9	26.1	25
SD 8070	33	June 15	10.6	16.5	48.2	25.0	--
NDWX371	27	June 17	9.6	17.4	45.1	24.2	23.8
Stoa	35	June 20	10.0	17.2	49.4	23.8	23.1
Dalen	30	June 16	9.8	16.2	46.9	23.0	--
Prospect	24	June 18	9.4	17.4	45.8	23.0	24.3
Amidon	34	June 20	9.7	17.6	43.9	21.8	23.1
2375	29	June 15	10.3	16.4	47.9	21.4	25.1
Grandin	33	June 19	9.3	16.4	43.4	20.9	21.6
Vance	30	June 20	8.9	16.3	44.7	20.5	18.6
SD 3015	31	June 16	9.7	17.9	45.8	20.2	--
SD 3056	25	June 17	9.9	19.5	4.34	18.9	--
Chris	37	June 19	8.9	16.9	44.6	18.4	17.8
Gus	31	June 20	9.7	17.3	48.1	17.1	20.9
Krona	26	June 19	10.1	17.9	41.2	15.3	--
SD 8072	31	June 15	8.4	17.0	42.5	13.7	--
SD 8073	29	June 18	9.2	17.4	42.4	11.6	--
Nordic	26	June 20	10.2	17.7	41.4	11.2	18.6

LSD(5%) - 4.9 Bu/A C.V. - 16.7% Mean - 21.3

*Percent protein determined with a Technicon 300 infraanalyzer.

NOTE: Plots were seeded April 9 and harvested August 3, 1992. Starter fertilizer was applied at 10.4 gallons per acre (12-41-0 #/A). Weeds were controlled with Ally at 1/10 oz/A. plus 2,4-D at 1/2 lb/A..

Meade County
(Plainview)

The spring wheat trial at Plainview was seeded on April 9. The soil was loose with moisture at seeding depth and down to 30 inches. Precipitation was below normal during May and early-June but was received at critical times. The rain provided moisture necessary to produce vigorous growing plants with numerous tillers. Grain yields were excellent with good protein levels. However, weight per bushel was reduced because of rainfall received between maturity and harvest. The data are listed in Table 16.

TABLE 16. Hard Red Spring Wheat Variety Trial-Meade County(Plainview), 1989-92

Variety	Height (Inches)	Date of Heading	Percent Moisture	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/A 1992	Grain Yield-Bu/A (4 yr av)
Krona	26	June 19	12.5	12.9	56.9	67.9	--
Stoa	28	June 19	12.4	14.7	57.7	58.8	30.3
Nordic	27	June 19	22.0	13.6	55.2	54.0	29.5
Prospect	27	June 18	16.3	15.6	56.9	53.0	--
Sharp	28	June 18	12.6	15.2	58.7	51.0	32.4
2371	27	June 17	16.6	15.0	57.4	50.8	--
Guard	25	June 17	12.3	14.1	57.7	50.1	27.2
Dalen	24	June 19	16.5	16.6	57.1	49.6	--
Grandin	27	June 20	13.8	17.4	56.7	49.6	31.2
Butte 86	27	June 18	13.4	14.8	57.5	47.4	29.5
2375	27	June 19	16.7	15.5	55.5	47.4	28.8
Bergen	22	June 19	13.2	14.4	54.9	44.6	--

LSD(5%) - 8.1 Bu/A C.V. - 11.0% Mean - 48.0

*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 9 and harvested August 12, 1992. Starter fertilizer was applied at 10.4 gallons per acre (12-41-0 #/A). Weeds were controlled with Buctril at 1/4 lb/A. plus MCPA at 1/2 lb/A..

Pennington County

Variety plots of spring wheat were seeded in fallow near Wall on April 16, 1992. The topsoil was dry and compacted, with clods on the surface, causing germination to be delayed until additional rain was received. Precipitation, below normal during April, varied during May, June, and July but averaged near normal. Usable rainfall during the spring growing season was 6.86 inches.

Air temperature was above normal from December through May, and below normal during June and July. Daily temperatures, during June averaged 2.6 degrees below normal, and during July 8.5 degrees below normal. The cool temperatures resulted in more efficient use of the available moisture. The wheat produced excellent spring wheat yields of very high quality grain. The results of the trial are presented in Table 17.

TABLE 17. Hard Red Spring Wheat Variety Trial - Pennington County (Wall),1989-92

Variety	Height (Inches)	Date of Heading	Percent Moisture	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre 1992	Grain Yield-Bu/Acre (4 yr av)
N87-0306	28	June 18	11.6	11.7	61.4	67.3	--
Krona	29	June 21	12.3	10.5	60.4	65.0	--
Bergen	29	June 20	11.6	10.8	61.1	64.7	37.5
NDWX371	30	June 19	11.6	11.5	60.4	64.1	--
SD 8073	33	June 18	12.2	12.3	60.3	62.4	--
Vance	32	June 22	11.3	12.7	59.8	61.9	25.8
Hi-Line	37	June 17	11.7	--	61.8	61.8	--
2375	33	June 18	12.3	11.6	62.1	61.0	29.8
Nordic	31	June 22	13.8	11.2	60.6	61.0	28.9
Prospect	31	June 20	12.2	12.6	60.8	59.4	31.0
SD 3056	33	June 18	11.5	11.3	60.6	58.9	--
Butte 86	34	June 18	11.7	10.9	62.0	58.7	30.1
Dalen	29	June 18	12.2	10.9	61.5	58.1	--
Guard	31	June 18	12.7	11.4	61.6	58.0	29.6
Norm	30	June 18	11.9	11.7	60.9	57.6	--
SD 8070	32	June 18	12.6	11.3	61.1	57.4	--
Stoa	37	June 22	11.7	11.0	60.8	56.9	27.2
SD 8072	34	June 18	11.8	11.3	61.5	56.8	--
Sharp	33	June 17	12.1	12.4	62.8	56.3	29.4
Amidon	38	June 22	12.4	12.0	59.7	55.4	26.3
Grandin	32	June 19	12.3	12.1	61.1	55.2	27.7
SD 8074	35	June 17	11.5	11.0	61.2	53.2	--
SD 3015	34	June 18	12.0	11.6	61.0	52.9	--
Gus	31	June 22	11.6	11.4	59.5	50.7	25.2
Chris	39	June 21	11.7	15.0	58.8	45.4	21.1

LSD(5%) - 7.8 Bu/A C.V. - 9.6% Mean - 58.4

*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 16 and harvested August 14, 1992. Starter fertilizer was applied at 12.1 gallons per acre (14-47-0 #/A). Weeds were controlled with Ally at 1/10 oz/A. plus 2,4-D at 1/2 lb/A..

Perkins County

Spring wheat variety trials were seeded near Bison on April 15. The soil was loose and dry, with subsoil moisture only to a depth of 12 inches. Except for the month of October, precipitation had been below normal and almost nonexistent from August through March. The area received only an inch of rain, or half of normal precipitation in April. Good rain showers were received intermittently from May through July. From mid-June through July air temperatures were below normal.

Moisture stress in early season resulted in the earlier maturing varieties producing less grain with higher weight per bushel and increased protein level. Grain yield averaged over 28 bushel per acre. The yield data are reported in Table 18.

TABLE 18. Hard Red Spring Wheat Variety Trial - Perkins County(Bison), 1989-92.

Variety	Height (Inches)	Date of Heading	Percent Moisture	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre 1992	Grain Yield-Bu/Acre (4 yr av)
Krona	22	June 19	15.7	12.5	57.0	46.3	--
Stoa	25	June 19	13.2	15.1	58.8	36.2	34.3
Vance	27	June 20	12.4	13.4	59.6	36.0	31.0
Prospect	25	June 18	13.3	13.2	59.7	35.8	34.6
Nordic	26	June 19	15.3	12.5	54.4	35.4	35.3
SD 8073	24	June 17	15.4	15.7	58.2	34.9	--
Gus	25	June 19	13.2	15.8	57.8	34.6	33.8
Amidon	29	June 19	14.0	16.4	55.4	34.0	33.9
Norm	25	June 18	15.9	14.5	53.6	32.9	35.8
N87-0306	22	June 18	13.9	14.8	60.3	31.9	--
Chris	30	June 20	13.1	13.6	59.6	31.3	28.0
SD 8070	24	June 16	13.0	15.6	59.3	31.1	--
SD 8074	25	June 17	12.5	15.5	59.1	29.9	--
Grandin	26	June 18	13.7	15.8	57.3	29.6	31.4
NDW 2371	24	June 18	13.0	14.6	57.7	29.3	27.9
Dalen	23	June 17	14.1	15.1	60.6	28.6	--
SD 3056	27	June 17	13.6	17.5	58.1	27.0	--
2375	22	June 17	14.5	15.8	57.3	26.6	31.6
Butte 86	23	June 16	12.2	14.0	59.4	25.4	29.7
SD 8072	23	June 16	12.3	15.5	59.1	24.6	--
Guard	23	June 16	13.2	14.3	60.5	24.5	30.2
Bergen	22	June 18	12.6	15.2	56.8	23.4	26.8
Sharp	26	June 16	12.6	15.2	58.6	23.2	29.3
SD 3015	23	June 17	12.9	15.5	60.0	23.0	--
Hi-Line	22	June 17	13.0	15.8	60.8	20.1	--

LSD(5%) - 5.3 Bu/A C.V. - 12.3% Mean - 28.4

*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 15 and harvested August 17, 1992. Starter fertilizer was applied at 9.7 gallons per acre (11-38-0 #/A). Weeds were controlled with Ally at 1/10 oz/A. plus 2,4-D at 1/2 lb/A..

Durum Wheat

Durum wheat variety trials were seeded at four locations in 1992. The remarks and discussion pertinent to these trials were included in the Hard Red Spring Wheat section and can be found on page 21 through 27. The yields and other data are listed in Tables 19 through 22.

TABLE 19. Durum Wheat Variety Trial - Harding County (Ralph), 1990-92.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre 1992	Grain Yield-Bu/Acre (3 yr av)
Renville	32	June 23	10.2	61.8	51.6	40.1
Fjord	32	June 22	10.9	63.2	50.9	39.2
Vic	33	June 23	11.6	62.0	48.7	38.2
Ward	33	June 21	11.0	62.7	48.6	38.5
Kamut	39	June 26	9.4	50.7	48.2	--
Stockholm	25	June 24	12.2	60.4	47.4	38.5
Monroe	30	June 20	12.0	61.9	46.2	38.2
Sheba	42	June 23	--	54.8	43.1	--

LSD(5%) - 4.0 Bu/A C.V. - 5.5% Mean - 48.1

*Protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 22 and harvested August 17, 1992. Starter fertilizer was applied at 10.4 gallons per acre (12-41-0 #/A). Weeds were controlled with Ally at 1/10 oz/A. plus 2,4-D at 1/2 lb/A..

TABLE 20. Durum Wheat Variety Trial - Meade County(Bear Butte), 1989 & 91-92.

Variety	Height (Inches)	Date of Heading	Percent Protein**	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre 1992	Grain Yield-Bu/Acre (3 yr av)
Ward	33	June 17	20.5	44.0	18.4	23.9
Fjord	31	June 18	20.5	45.8	16.9	26.0
Monroe	31	June 16	20.2	41.0	12.7	22.4
Renville	33	June 19	21.6	39.5	9.8	21.5
Vic	31	June 19	21.4	38.5	6.8	22.1
Stockholm	23	June 19	24.2	34.8	4.8	19.3

LSD(5%) - 2.0 Bu/A C.V. - 11.8% Mean - 11.6

*Percent protein was determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 9 and harvested August 3, 1992. Starter fertilizer was applied at 10 gallons per acre (10-34-0 #/A). Weeds were controlled with Ally at 1/10 oz/A. plus 2,4-D at 1/2 lb/A..

TABLE 21. Durum Wheat Variety Trial - Pennington County (Wall), 1990-92.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre 1992	Grain Yield-Bu/Acre (3 yr av)
Ward	36	June 19	11.9	60.3	55.0	25.6
Vic	34	June 18	12.2	59.5	54.6	25.2
Stockholm	26	June 20	10.7	60.8	54.2	24.8
Renville	35	June 20	11.0	60.3	53.7	24.7
Monroe	32	June 17	11.8	60.5	49.2	25.3
Fjord	34	June 19	13.1	60.3	48.8	24.4
Kamut	40	June 18	12.8	57.8	41.6	--
Sheba	42	June 18	12.4	54.5	37.8	--

LSD(5%) - 8.0 Bu/A C.V. - 10.1% Mean - 49.4

*Percent protein was determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 16 and harvested August 14, 1992. Starter fertilizer was applied at 12.1 gallons per acre (14-47-0 #/A). Weeds were controlled with Ally at 1/10 oz/A. plus 2,4-D at 1/2 lb/A..

TABLE 22. Durum Wheat Variety Trial - Perkins County (Bison), 1989-92.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre 1992	Grain Yield-Bu/Acre (4 yr av)
Renville	25	June 19	15.1	58.6	26.7	31.1
Ward	24	June 19	15.3	58.4	25.4	28.9
Fjord	25	June 19	13.5	58.6	22.5	28.8
Monroe	24	June 17	13.2	58.0	22.2	28.7
Vic	26	June 19	14.7	57.2	21.1	27.9
Stockholm	20	June 19	15.8	55.0	21.0	28.8

LSD(5%) - 3.2 Bu/A C.V. - 14.9% Mean - 23.0

*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 15 and harvested August 18, 1992. Starter fertilizer was applied at 12.1 gallons per acre (14-47-0 #/A). Weeds were controlled with Ally at 1/10 oz/A. plus 2,4-D at 1/2 lb/A..

Winter Triticales

Plots were seeded at six locations in 1992. All trials were seeded in fallow soil with a six row plot seeder having a ten inch row spacing. Seeding rate was controlled by prepackaging all seed. Fertilizer requirements were predetermined by soil test. Harvesting was accomplished with a self-propelled plot combine. Grain yield and other data are reported in Tables 23 through 28. Weeds were controlled with Ally at 0.1 oz/A plus 2,4-D at 1/2 lb/A.

TABLE 23. Winter Triticale Variety Trial - Bennett County(Martin), 1989-92.

Variety	Percent Stand 11/91	4/92	Date of Heading	Height (Inches)	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/A 1992	(4 yr av)
Jenkins	69	73	June 3	50	11.7	50.4	65.6	36.8
Newcales	86	68	May 19	38	11.9	49.7	64.6	51.2
Winteri	83	80	June 2	52	12.1	49.4	62.7	32.8
18249	74	49	May 21	46	11.6	50.4	50.6	40.9
Thunderbird**	86	84	May 23	31	14.7	57.9	44.1	43.0

LSD(5%) - 8.1 Bu/A C.V. - 9.4% Mean - 60.9

*Percent protein was determined with a Technicon 300 InfraAnalyzer.
**HRW Wheat (var.- Thunderbird) was used as a standard for comparison

NOTE: Plots were seeded September 16, 1991 and harvested August 5, 1992.

TABLE 24. Winter Triticale Variety Trial - Fall River County(Oelrichs), 1989-92.

Variety	Percent Stand 11/91	4/92	Date of Heading	Height (Inches)	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/A 1992	(4 yr av)
Winteri	43	81	MAy 23	57	7.0	52.0	89.2	72.3
Jenkins	46	79	May 22	55	8.3	54.1	87.0	75.6
Newcales	50	83	May 15	40	8.6	52.2	78.0	72.2
18249	35	85	May 18	47	8.2	52.4	73.8	64.2
Thunderbird**	65	89	May 19	31	10.0	59.3	65.9	56.4

LSD(5%) -15.4 Bu/A C.V. - 12.5% Mean - 82.0

*Percent protein was determined with a Technicon 300 InfraAnalyzer.
**HRW Wheat (var.- Thunderbird) was used as a standard for comparison

NOTE: Plots were seeded September 14, 1991 and harvested July 24, 1992.

TABLE 25. Winter Triticale Variety Trial - Harding County(Ralph), 1989-90,1992

Variety	Percent Stand 11/91	4/92	Date of Heading	Height (Inches)	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/A 1992	(3 yr av)
Jenkins	83	68	June 7	44	11.0	55.5	63.0	43.8
Winteri	85	63	June 6	46	10.6	52.8	55.7	39.9
18249	84	35	June 2	44	10.7	53.8	49.3	37.0
Newcales	88	23	June 1	37	11.1	53.3	48.6	31.7
Thunderbird**	88	64	June 2	27	13.0	61.8	34.1	34.0

LSD(5%) -10.4 Bu/A C.V. - 13.8% Mean - 54.2

*Percent protein was determined with a Technicon 300 InfraAnalyzer.
**HRW Wheat (var.- Thunderbird) was used as a standard for comparison

NOTE: Plots were seeded September 18, 1991 and harvested August 10, 1992.

TABLE 26. Winter Triticale Variety Trial - Meade County (Bear Butte), 1989-92.

Variety	Percent Stand 11/91	Percent Stand 5/92	Date of Heading	Height (Inches)	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/A 1992	Grain Yield-Bu/A (4 yr av)
Jenkins	69	73	June 3	50	11.7	50.4	65.6	36.8
Newcale	86	68	May 19	38	11.9	49.7	64.6	51.2
Winteri	83	80	June 2	52	12.1	49.4	62.7	32.8
18249	74	49	May 21	46	11.6	50.4	50.6	40.9
Thunderbird**	86	84	May 23	31	14.7	57.9	44.1	43.0

LSD(5%) - 8.1 Bu/A. C.V. - 9.4% Mean - 60.9

*Percent protein determined with a Technicon 300 InfraAnalyzer.
**HRW Wheat (var.) Thunderbird was used as a standard for comparison.
NOTE: Plots were seeded September 13, 1991 and harvested July 20, 1992.

TABLE 27. Winter Triticale Variety Trial - Pennington County (Wall), 1989-92.

Variety	Percent Stand 11/91	Percent Stand 6/92	Date of Heading	Height (Inches)	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/A 1992	Grain Yield-Bu/A (4 yr av)
Jenkins	70	74	May 27	55	8.2	47.7	105.8	64.5
Winteri	78	84	May 24	56	8.3	46.8	97.6	62.7
Newcales	88	73	May 17	36	9.6	51.3	89.0	67.8
18249	80	78	May 20	46	8.4	50.2	81.8	59.6
Thunderbird**	78	73	May 21	32	11.7	59.2	59.1	45.2

LSD(5%) - 14.0 Bu/A C. V. - 10.82% Mean - 93.6

*Percent protein was determined with a Technicon 300 InfraAnalyzer.
**HRW Wheat (var.- Thunderbird) was used as a standard for comparison.
NOTE: Plots were seeded September 16, 1991 and harvested July 24, 1992.

TABLE 28. Winter Triticale Variety Trial - Perkins County (Bison), 1989-92.

Variety	% Stand 11/91	% Stand 4/92	Date of Heading	Height (Inches)	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/A 1992	Grain Yield-Bu/A (4 yr av)
Jenkins	68	10	June 10	42	10.6	50.2	39.8	36.1
Winteri	69	16	June 10	41	10.1	49.2	35.8	33.2
Newcale	73	15	June 5	30	11.3	51.6	29.9	27.4
18249	69	7	June 5	43	11.4	49.2	29.3	31.7
Thunderbird**	69	52	June 6	22	14.6	57.4	20.5	28.7

LSD(5%) - 6.8 Bu/A. C.V. - 14.8% Mean - 33.7

*Percent protein determined with Technicon 300 InfraAnalyzer.
**HRW Wheat (var.) Thunderbird was used as a standard for comparison.
NOTE: Plots were seeded September 17, 1991 and harvested August 12, 1992.

Spring Triticale

Plots were seeded at four locations in 1992. All trials were seeded in fallow soil with a six row plot seeder having an eight inch row spacing. Seeding rate was controlled by prepackaging all seed. Fertilizer requirements were predetermined by soil test. Weeds were controlled with Ally at 1/10 oz/A plus 2,4-D at 1/2 lb/A.. Harvesting was accomplished with a selfpropelled plot combine. Grain yields and other data are reported in Tables 29 through 32.

TABLE 29. Spring Triticales Variety Trial - Harding County (Ralph), 1989-92.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre 1992	Grain Yield-Bu/Acre (4 yr av)
Trical Grace	43	June 24	7.8	47.3	100.4	--
Marval	41	June 21	8.0	48.8	70.1	47.5
Kramer	35	June 20	9.4	48.4	63.8	43.4
Trical Victoria	38	June 20	8.7	49.8	62.3	47.4

LSD(5%) - 4.4 Bu/A. C.V. - 10.0% Mean - 74.2

*Percent protein was determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 22 and harvested August 17, 1992. Weeds were controlled with Ally at 0.1 oz/A plus 2,4-D at 1/2 lb/A.

TABLE 30. Spring Triticales Variety Trial - Meade County (Bear Butte), 1991-92.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre 1992	Grain Yield-Bu/Acre (2 yr av)
Trical Victoria	40	June 16	12.0	44.5	60.9	46.3
Kramer	36	June 16	12.8	43.5	59.8	49.6
Trical Grace	44	June 19	13.8	42.3	38.7	32.2
Marval	42	June 16	13.9	34.0	29.0	28.8

LSD(5%) - 8.3 Bu/A C.V. - 13.2% Mean - 31.4

*Percent protein was determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 9 and harvested August 3, 1992. Weeds were controlled with Ally at 0.1 oz/A plus 2,4-D at 1/2 lb/A.

TABLE 31. Spring Triticales Variety Trial - Pennington County (Wall), 1989-92.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre 1992	Grain Yield-Bu/Acre (4 yr av)
Trical Grace	40	June 19	13.8	50.8	74.7	--
Marval	39	June 18	9.6	49.5	69.6	23.2
Kramer	34	June 18	10.2	47.8	64.5	32.0
Trical Victoria	37	June 18	10.2	50.8	62.5	27.3

LSD(5%) - 6.0 Bu/Acre C.V. - 14.6% Mean - 67.8

*Percent protein was determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 16 and harvested August 14, 1992. Weeds were controlled with Ally at 0.1 oz/A plus 2,4-D at 1/2 lb/A.

TABLE 32. Spring Triticale Variety Trial - Perkins County (Bison), 1989-92.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre 1992	Grain Yield-Bu/Acre (4 yr av)
Trical Grace	36	June 20	10.5	46.0	63.2	--
Marval	34	June 18	10.7	46.0	49.2	52.4
Trical Victoria	31	June 18	10.2	48.0	47.2	53.0
Kramer	30	June 17	12.4	46.3	38.4	56.1

LSD(5%) - 2.8 Bu/A C.V. - 11.9% Mean - 49.5

*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 15 and harvested August 18, 1992.Weeds were controlled with Ally at 0.1 oz/A plus 2,4-D at 1/2 lb/A.

Discussion Spring triticale varieties grown under the moisture conditions of 1992 produced grain yields 52% greater than those of Hard Red Spring Wheat. Comparing the yields of Durum wheat and Spring Triticales indicated a 67% advantage of Triticales over Durum wheat. The test weights were near the standard weight of 48 pounds when moisture stress was not a factor, under moisture stress the test weights were reduced by up to six pounds per bushel. It is best utilized as a grain feed for swine or poultry.

Oat Variety Trials

Oat variety trials were conducted on a cooperative basis at six locations in 1992. Seeding dates ranged from April 8 to April 22. All trials were seeded on fallow with a six row plot seeder having an eight inch row spacing. Seeding rates were controlled by prepackaging all seed. Fertilizer requirements were predetermined by soil test. Weeds were controlled with MCPA ester at 1/2 lb/A. plus Buctril at 1/4 lb/A. Harvesting was accomplished with a self-propelled plot combine. Grain yield and other data are reported in Tables 33 through 39.

Bennett County

Oat variety plots at Martin were seeded on April 8 into fallowed soil. The soil was mellow, but dry at the surface. Subsoil moisture was available to a depth of 36 inches. Precipitation was below normal during April and May, and almost normal during June. During July rainfall was 1.68 inches above normal. Usable moisture from April through July totaled 4.67 inches.

During April and May the average air temperatures were slightly over 2 degrees above normal. During the summer months the temperatures were below normal. The subnormal temperatures coupled with above normal precipitaion resulted in an average grain yield in excess of 149 bushel per acre. Weights per bushel ranged from 32.6 to 38.3 pounds. The data are listed in Table 33.

TABLE 33. Oat Variety Trial - Bennett County (Martin), 1990-92.

Variety	Height (Inches)	Relative Maturity*	Moisture Percent	Test Wt (Lbs/Bu)	Grain Yield-Bu/Acre 1992	Grain Yield-Bu/Acre (3 yr av)
Monida	35	11	14.8	36.2	190.8	96.4
Troy	40	7	13.9	36.6	174.3	94.1
Newdak	34	5	10.4	34.6	170.6	97.7
Prairie	33	6	12.0	33.3	171.6	--
Porter	35	11	12.8	35.9	161.7	88.8
Armor	33	6	11.8	34.0	161.0	--
SD 87572	36	7	12.2	37.1	160.6	--
Valley	31	9	12.8	36.2	159.6	86.5
Ogle	33	4	9.8	34.1	159.1	92.7
Horicon	35	5	10.7	33.0	159.1	93.5
Moore	40	7	13.0	36.0	156.6	86.4
Burnett	37	4	12.2	34.5	154.8	82.6
Sheldon	37	5	11.1	34.4	152.9	--
SD 88091	32	0	10.2	34.6	147.1	--
Dane	35	4	10.8	30.5	146.9	89.5
SD 88051	35	9	10.9	35.9	142.0	--
Hytest	41	4	12.6	38.3	140.2	77.2
Hazel	29	4	9.3	32.6	138.3	84.2
Settler	34	5	11.2	37.4	137.6	82.2
Don	31	1	10.5	33.6	135.5	84.8
Hamilton	33	1	10.7	33.0	134.4	86.0
SD 88373	32	0	10.5	35.0	133.8	--
Premier	33	3	12.6	35.8	132.4	86.5
Kelly	36	1	10.5	34.9	130.8	79.4
Starter	33	0	10.4	35.6	127.7	76.8

LSD(5%) - 9.9 Bu/A C.V. - 4.9% Mean - 149.5

*Relative maturity is based on 60 days from seeding to day of heading.

NOTE: Plots were seeded April 8 and harvested August 4, 1992. Weeds were controlled with MCPA at 1/2 lb/A. plus Buctril at 1/4 lb/A.

Harding County

Oat varieties in Harding County were seeded near Ralph on April 22. The soil had been recently tilled and in a good state of tilth. Subsoil moisture was present to 24 inches. Total rainfall from April through July was 10.28 inches. Total usable moisture received during the April-July growing season was 6.32 inches. Air temperatures were above normal during all of the spring months. However, timely showers with daily maximum temperatures below 75 degrees in July and 79 degrees in August, resulted in high grain yields. The average for the trial was near 134.8 bushels per acre with a highest yield being 198.8 bushels per acre. Data for the trial can be found in Table 34.

TABLE 34. Oat Variety Trial - Harding County (Ralph), 1990-1992.

Variety	Height (Inches)	Date of Heading	Percent Moisture	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre 1992	Grain Yield-Bu/Acre (3 yr av)
Monida	35	June 16	22.6	34.8	198.8	113.5
Prairie	35	June 21	14.5	33.6	177.5	--
NewDak	37	June 19	13.5	36.4	176.2	117.7
Porter	38	June 24	14.6	38.2	175.5	94.8
Troy	42	June 22	16.1	37.0	170.7	96.0
Ogle	37	June 19	13.3	35.4	168.0	97.6
Horicon	36	June 20	16.5	34.6	166.8	--
Valley	35	June 22	18.8	36.6	164.5	96.1
SD 87572	36	June 21	18.6	36.7	158.8	--
SD 88051	38	June 20	13.6	37.0	157.2	--
Sheldon	38	June 19	16.4	36.8	157.2	--
Armor	32	June 20	12.9	33.1	154.8	--
Moore	39	June 22	17.7	38.0	153.5	87.2
Dane	35	June 19	17.7	33.4	152.2	92.9
Burnett	39	June 19	16.8	37.8	144.8	86.0
SD 88091	32	June 18	14.4	34.4	139.2	--
Premier	34	June 19	19.4	38.2	138.5	84.9
Settler	35	June 19	14.0	37.4	134.2	87.2
Hytest	37	June 20	15.2	37.2	131.2	81.3
Hamilton	34	June 18	11.7	34.0	130.8	86.4
SD 88373	31	June 17	14.1	33.5	130.2	--
Kelly	35	June 19	16.2	37.3	126.8	72.9
Hazel	30	June 19	15.5	34.4	124.5	80.9
Starter	34	June 18	16.7	37.7	124.0	78.0
Don	31	June 17	16.2	34.7	118.5	79.4

LSD(5%) - 17.6 Bu/Acre C.V. - 8.4% Mean - 134.8

NOTE: Plots were seeded April 22 and harvested August 11, 1992.Weeds were controlled with MCPA at 1/2 lb/A. plus Buctril at 1/4 lb/A.

Meade County
(Bear Butte Valley)

The Oat variety trial in Bear Butte Valley was seeded into fallow soil on April 9. The soil was dry to seeding depth but contained moisture below to a depth of 24 inches. Rain showers during April and May were below normal but were received at critical times. The plants produced numerous tillers with a potential for high yield. Moisture became critically short during the period when the kernels were filling. The result was small unfilled seed with low starch content, high protein content, and low test weight. The data are reported in Table 35.

TABLE 35. Oat Variety Trial - Meade County (Bear Butte), 1990-92.

Variety	Height (Inches)	Date of Heading	Percent Moisture	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre 1992	Grain Yield-Bu/Acre (3 yr av)
Prairie	35	June 16	6.4	34.6	139.0	--
Porter	37	June 20	7.1	36.8	126.8	69.7
Troy	41	June 19	6.4	37.2	122.5	72.1
Armor	37	June 16	8.7	34.2	120.2	--
Valley	32	June 17	7.2	36.4	113.9	64.0
Horicon	35	June 15	6.7	34.5	113.2	--
Sheldon	36	June 14	7.3	37.9	106.0	--
Newdak	35	June 14	6.2	34.0	105.0	67.3
Hazel	32	June 12	6.9	36.9	104.2	62.8
Don	31	June 12	6.7	36.6	101.9	64.4
Ogle	33	June 13	6.4	33.8	99.7	66.0
Burnett	39	June 13	7.7	37.6	97.1	58.4
Moore	39	June 17	7.1	36.4	95.3	62.3
SD 88091	32	June 13	7.1	36.0	94.3	--
Dane	33	June 13	6.2	35.2	93.5	64.2
SD 88373	32	June 12	6.9	36.0	92.4	--
Starter	33	June 12	7.3	38.0	91.8	61.4
Settler	38	June 15	7.8	37.3	90.3	61.2
Hytest	41	June 15	7.4	39.5	90.1	54.8
SD 87572	36	June 17	6.4	35.4	87.7	--
Hamilton	32	June 13	7.0	34.3	87.3	62.7
SD 88051	34	June 16	7.1	35.2	85.4	--
Premier	32	June 12	7.7	37.2	81.2	59.5
Kelly	34	June 13	8.3	36.9	75.2	52.7

LSD(5%) - 9.9 Bu/Acre C.V. - 9.3% Mean - 100.6

NOTE: Plots were seeded April 9 and harvested August 3, 1992. Weeds were controlled with MCPA at 1/2 lb/A. plus Buctril at 1/4 lb/A.

Meade County
(Plainview)

The Oat trial at Plainview was seeded into fallow soil on April 9. The soil was loose with moisture at seeding depth, and down to 30 inches. Precipitation was below normal during May and early-June but was received at critical times. The rain provided moisture necessary to produce vigorous growing plants with numerous tillers. Grain yields were excellent with good protein levels. Weight per bushel was reduced because of rainfall received between maturity and harvest. The data are listed in Table 36.

TABLE 36. Oat Variety Trial - Meade County (Plainview), 1990-92.

Variety	Height (Inches)	Date of Heading	Seed Color	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre 1992	(3 yr ave)
Monida	36	June 24	Creamy White	36.9	153.5	83.5
Troy	38	June 20	White	36.8	147.5	42.8
Newdak	32	June 17	White	34.6	142.2	80.5
Valley	28	June 17	Ivory	36.6	141.2	76.6
Settler	32	June 17	White	38.4	114.3	69.7
Burnett	33	June 16	Ivory	36.5	113.0	64.9
Hytest	36	June 18	Lt Cream	40.6	106.9	61.2
Don	30	June 15	White	35.8	100.5	60.1
Premier	29	June 16	Yellow	38.7	100.4	62.0
Kelly	33	June 17	White	37.3	99.9	57.8
Hazel	24	June 17	White	35.2	87.6	58.4
Porter	35	June 24	Lt Tan	29.6	62.9	--
Ogle	35	June 18	Yellow	30.6	60.2	--

LSD(5%) - 15.8 Bu/Acre C.V. - 9.4% Mean - 115.4

NOTE: Plots were seeded April 9 and harvested August 12, 1992. Weeds were controlled with MCPA at 1/2 lb/A. plus Buctril at 1/4 lb/A.

Pennington County

The oat variety trial near Wall was seeded into fallow soil on April 16, 1992. The topsoil was dry and compacted with clods at the surface. Germination was delayed until additional rain was received. Precipitation, below normal during April, varied during May, June, and July. Overall, the average was near normal. Usable moisture received during the spring season was 6.86 inches.

Temperatures during the early part of the growing season were above normal. During the later part of the season they fell below normal and provided ideal conditions for efficient moisture use. Grain yields were high and almost double the three year average. Test weights of most of the varieties were several pounds above standard. Data can be found in Table 37.

TABLE 37. Oat Variety Trial - Pennington County (Wall), 1989-92.

Variety	Height (Inches)	Date of Heading	Moisture Percent	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre 1992	Grain Yield-Bu/Acre (3 yr av)
Troy	42	June 17	12.4	36.6	190.5	106.7
Armor	39	June 19	12.3	36.2	185.0	--
Horicon	41	Jun 18	17.4	36.2	176.5	--
Newdak	34	June 18	13.9	35.3	173.2	104.7
Moore	43	June 19	14.2	37.8	172.0	97.4
Prairie	33	June 19	16.3	34.3	171.5	--
Starter	34	June 16	9.5	39.2	169.2	104.8
Valley	33	June 19	17.8	35.8	163.8	102.7
Porter	36	June 21	12.9	37.0	162.0	96.9
SD 88373	35	June 16	10.8	35.6	160.0	--
SD 87572	38	June 19	14.5	36.9	156.8	--
Ogle	34	June 17	12.5	36.0	156.0	98.5
Hamilton	34	June 16	12.9	34.8	150.8	98.6
Don	33	June 15	10.4	37.8	150.2	98.4
SD 88091	36	June 16	12.2	35.7	150.0	--
Hytest	42	June 18	13.4	41.0	149.0	92.6
Premier	35	June 17	13.3	38.4	147.2	100.7
Kelly	38	June 17	12.9	38.2	144.0	85.9
Burnett	39	June 17	15.2	38.4	143.8	88.7
Sheldon	38	June 17	14.3	38.0	143.0	--
Hazel	32	June 16	13.2	36.6	142.8	94.7
SD 88051	36	June 19	12.7	36.1	142.8	--
Settler	34	June 18	10.8	36.5	142.5	95.8
Monida	35	June 19	18.4	33.3	142.5	94.8
Dane	35	June 16	9.2	35.6	138.8	95.3

LSD(5%) - 29.7 Bu/A C.V. - 14.3% Mean - 157.0

NOTE: Plots were seeded April 16 and harvested August 6, 1992. Weeds were controlled with MCPA at 1/2 lb/A. plus Buctril at 1/4 lb/A.

Perkins County

Oat varieties in Perkins County were seeded near Bison on April 15. The soil was loose and dry. with subsoil moisture only to a depth of 12 inches. Except for the month of October, precipitation had been subnormal from August through March. The area received only an inch of rain during April. Rain showers were received intermittently from May through July. The showers together with cool growing conditions during late June and July resulted in extremely high grain yields. Test weights were up to 7.6 pounds above standard weight. The data for the trial can be found in Table 38.

TABLE 38. Oat Variety Trial - Perkins County (Bison), 1990-92.

Variety	Height (Inches)	Date of Heading	Moisture Percent	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre 1992	Grain Yield-Bu/Acre (3 yr av)
Monida	31	June 20	14.2	37.2	176.0	108.1
Porter	30	June 20	11.0	36.6	163.0	98.9
Newdak	30	June 17	9.4	34.7	161.5	99.2
Troy	35	June 20	9.5	37.0	152.8	97.0
Prairie	29	June 18	9.0	34.0	151.2	--
Horicon	31	June 17	11.4	34.2	143.8	--
Moore	35	June 20	11.0	37.4	143.5	88.6
SD 87572	30	June 19	12.0	37.0	142.8	--
Valley	28	June 18	10.4	36.8	140.2	91.1
Armor	26	June 19	11.6	34.4	132.0	--
Hytest	35	June 17	12.8	39.6	128.5	81.8
Burnett	31	June 17	12.3	37.0	128.5	79.1
Settler	30	June 17	11.7	36.2	128.5	86.4
SD 88051	32	June 18	9.1	36.5	126.0	--
Starter	29	June 16	13.9	35.6	124.0	82.2
Hamilton	27	June 17	11.6	32.5	124.0	78.8
Ogle	28	June 17	10.2	33.4	122.2	85.2
Sheldon	32	June 18	9.9	36.2	119.1	--
Dane	28	June 16	10.5	34.8	118.0	79.6
Premier	29	June 17	12.2	36.3	110.6	77.8
Hazel	26	June 16	11.2	35.2	108.2	73.1
Kelly	30	June 16	11.8	37.2	106.1	68.1
SD 88091	26	June 16	9.1	35.0	98.8	--
Don	24	June 15	11.6	34.6	97.2	71.7
SD 88373	25	June 16	9.6	33.7	92.5	--

LSD(5%) - 18.3 Bu/A C.V. - 10.6% Mean - 129.6

NOTE: Plots were seeded April 15 and harvested August 18,1992. Weeds were controlled with MCPA at 1/2 lb/A. plus Buctril at 1/4 lb/A.

Spring Barley Trials

Spring barley variety trials were conducted at six locations in 1992. Soil moisture was adequate for germination and emergence at most sites. Seeding was accomplished with a six row plot seeder having an eight inch row spacing. Rate of seeding was controlled by prepackaging all seed. Fertilizer requirements were predetermined by soil test. The dates of seeding ranged from April 8 to April 22. Harvesting was completed with a self-propelled plot combine between August 3 and August 18. Trial data are reported in Tables 39 through 44.

Bennett County

The spring barley variety trial at Martin was seeded on April 8 into fallowed soil. Moisture in the seedbed at time of seeding was satisfactory for germination. Precipitation during April and May was below normal. In late June the rainfall increased and during July was 1.68 inches above normal.

Air temperatures were several degrees above normal during April and May, but were below normal during June and July. The additional rain and cool temperatures during the final stages of growth resulted in grain yields which averaged 101.8 bushels per acre. Test weights were slightly below standard because the plots were harvested before they were completely nature. Data in Table 39.

TABLE 39. Spring Barley Variety Trial - Bennett County (Martin), 1990,92.

Variety	Height (Inches)	Relative Maturity*	Percent Protein**	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre 1992	Grain Yield-Bu/Acre (2 yr av)
ND 11055	34	1	7.9	46.5	113.5	--
Stander	33	3	8.1	47.0	111.5	--
Stander (M-64)	32	3	10.2	47.0	108.8	67.2
Hazen	33	2	8.6	46.8	108.1	68.9
B1602	36	2	9.2	46.0	103.3	64.5
B1603	33	1	10.8	46.2	101.3	50.6
EXB2912	36	2	8.6	46.5	99.6	--
Gallatin	31	4	9.7	50.0	98.5	66.5
Bowman	27	1	9.1	51.0	97.2	68.6
Robust	36	3	11.2	48.8	96.4	60.6
Stark (ND 9866)	29	2	8.8	51.0	95.2	65.4
Morex	36	1	10.6	47.0	88.0	56.0

LSD(5%) - 10.6 Bu/A C.V. - 7.2% Mean - 101.8

*Indicates maturity based on 60 day interval between seeding and heading.
**Percent protein was determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 8 and harvested August 4, 1992. Weeds were controlled with Ally at 1/10 oz/A. plus 2,4-D at 1/2 lb/A.

Harding County

Experimental plots containing 13 varieties of spring barley were seeded near Ralph on April 22. Soil moisture, adequate for germination and emergence, was measured to a depth of 24 inches. Precipitation during the period April through July was 10.28 inches, and of which 6.32 inches was usable.

Air temperatures were above normal during all of the spring months. However, timely showers with moderate temperatures during late-June and below normal tenperatures during July resulted in heavy plant growth and numerous tillers. Yield of grain was extremely high with above standard test weight. The grain, slow to mature, was harvested on August 11 when grain moisture content ranged from 11.7% up to 22.6%. The trial data are listed in Table 40.

TABLE 40. Spring Barley Variety Trial - Harding County (Ralph), 1990-92.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre 1992	Grain Yield-Bu/Acre (3 yr av)
EXB2912	34	June 21	7.6	49.8	111.8	--
Gallatin	28	June 19	7.0	52.8	103.7	77.5
Stark (ND 9866)	30	June 18	8.7	53.1	103.5	73.8
ND 11055	30	June 19	6.9	50.3	99.7	--
Stander (M-64)	29	June 21	6.7	50.6	98.8	--
B1602	33	June 22	7.8	50.8	96.2	66.8
Excel	30	June 19	7.3	49.4	96.2	67.6
Robust	32	June 20	7.2	51.0	95.8	69.4
B1603	30	June 19	7.7	48.9	92.1	--
Hazen	32	June 20	7.0	49.0	91.6	70.2
Bowman	27	June 18	7.9	53.4	91.1	71.4
Morex	32	June 19	7.4	48.5	87.8	60.0

LSD(5%) - 20.7 Bu/A C.V. - 14.8% Mean - 97.4

*Percent protein was determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 22 and harvested August 11,1992. Weeds were controlled with Ally at 1/10 oz/A. plus 2,4-D at 1/2 lb/A.

Meade County
(Bear Butte Valley)

Spring barley varieties were seeded in Bear Butte Valley on April 9. The seedbed was dry, but subsoil moisture was present to a depth of 24 inches. The lack of spring moisture resulted in slow growing seedlings. Timely rains in May provided moisture to keep the plants alive and develop large crowns. In June with cool conditions the plants grew tall with long heads. Limited rainfall during July did not provide sufficient moisture to maintain the plants. As a result the plants were killed by drought before the grain had completely filled. Grain yield was above the 3 year average but the test weights of some varieties were nearly 10 pounds below standard. The trial data are listed in Table 41.

TABLE 41. Spring Barley Variety Trial - Meade County(Bear Butte), 1990-92.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre 1992	Grain Yield-Bu/Acre (3 yr av)
Gallatin	31	June 13	11.0	46.9	74.6	55.1
Stander (M-64)	32	June 15	9.8	40.0	73.0	--
B1602	35	14	11.1	40.9	71.3	46.9
Robust	35	June 15	10.5	42.2	70.0	49.8
Excel	33	June 16	10.1	40.2	69.1	51.2
Stark (ND 9866)	33	June 14	11.1	43.8	68.6	52.6
Morex	34	June 14	10.6	40.2	64.7	46.5
Bowman	29	June 13	11.2	44.7	64.3	54.8
Hazen	34	June 15	11.3	38.8	62.9	46.7
ND 11055	33	June 15	10.2	38.2	62.6	--
EXB2912	32	June 17	12.3	40.6	58.3	--
B1603	32	June 14	11.1	38.1	54.0	--

LSD(5%) - 8.8 Bu/A C.V. - 10.7% Mean - 61.0

*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 9 and harvested August 3, 1992. Weeds were controlled with Ally at 1/10 oz/A. plus 2,4-D at 1/2 lb/A.

Meade County (Plainview)

The spring barley variety trial at Plainview was seeded on April 9. The surface soil was loose with subsoil moisture at seeding depth and present down to 30 inches. Precipitation was below normal during May and early-June but was received at critical times. The rain provided moisture necessary to produce vigorous growing plants with numerous tillers. Total usable moisture during the spring growing season was 8.22 inches. Grain yields were excellent with high protein levels. Weight per bushel averaged near standard. Trial data are given in Table 42.

TABLE 42. Spring Barley Variety Trial - Meade County(Plainview), 1990-92.

Variety	Height (Inches)	Date of Heading	Percent Protein**	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre 1992	Grain Yield-Bu/Acre (3 yr av)
Excel	27	June 17	11.0	46.4	86.6	33.3
Bearpaw	28	June 18	11.0	48.8	86.3	28.8
B1602	31	June 18	10.6	45.9	83.9	26.2
Gallatin	27	June 17	11.9	49.7	81.2	37.1
Hazen	29	June 17	10.2	44.6	81.2	35.3
Stark	28	June 17	10.4	49.5	80.5	--
Bowman	26	June 17	11.2	49.0	75.2	51.8
Morex	31	June 17	10.2	46.5	68.3	29.8
SD 71-672	30	June 17	12.9	49.3	61.5	--
LSD(5%) - 7.9 Bu/A		C.V. - 7.1%		Mean -	65.6	

*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 9 and harvested August 12, 1992. Weeds were controlled with Ally at 1/10 oz/A. plus 2,4-D at 1/2 lb/A.

Pennington County

Spring barley was seeded into fallowed soil near Wall on April 16. The topsoil was dry and compacted with clods at the surface. Germination was slow until additional rain was received. Precipitation, below normal during April, was near normal during May, and above normal during June, and July. The timely rains with cool conditions in late spring resulted in good plant growth. Plants were tall and had long heads. The grain yield average of 109 bushel per acre was 50% larger than the 3 year average. Weight per bushel was up to 5 pounds heavier than standard. The trial data are given in Table 43.

Perkins County

Spring barley plots were seeded near Bison on April 15. The soil had been fallowed in 1991. The soil was loose, dry, and had not been tilled. Moisture was not present in the surface soil. Subsoil moisture, measured to a depth of 36 inches in September, was only present to a depth of 12 inches in the spring. The area received only an inch of rain during April. In May timely rainshowers were received, and above normal precipitation during June and July. Cool growing conditions were experienced during late spring and summer. The plants were short but had good head development. Grain yield averaged over 106 bushels per acre with normal test weights. The data for the trial can be found in Table 44.

TABLE 43. Spring Barley Variety Trial - Pennington County (Wall), 1990-92.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre 1992	Grain Yield-Bu/Acre (3 yr av)
Gallatin	32	June 18	6.2	52.9	124.3	77.0
Excel	33	June 19	8.0	50.2	115.2	70.2
Stander (M-64)	33	June 19	6.8	50.0	114.2	--
ND 11055	33	June 19	6.3	49.9	113.0	--
Stark (ND9866)	32	June 16	7.8	54.2	111.0	75.9
Robust	36	June 19	9.5	50.5	110.2	66.4
Bowman	30	June 16	9.5	53.8	109.2	73.9
B1602	34	June 19	8.0	50.8	108.0	64.9
EX B2912	35	June 19	8.2	48.5	105.3	--
Hazen	34	June 18	8.9	50.2	102.8	66.3
B1603	32	June 18	9.2	49.2	98.7	--
Morex	36	June 19	8.1	49.4	97.9	63.6

LSD(5%) - 15.1 Bu/A C.V. - 8.4% Mean - 109.2

*Percent protein was determined with a Technicon InfraAnalyzer.

NOTE: Plots were seeded April 16 and harvested August 6, 1992. Weeds were controlled with Ally at 1/10 oz/A. plus 2,4-D at 1/2 lb/A.

TABLE 44. Spring Barley Variety Trial - Perkins County (Bison), 1990-92.

Variety	Height (Inches)	Date of Heading	Percent Protein*	Test Wt. (Lbs/Bu)	Grain Yield-Bu/Acre 1992	Grain Yield-Bu/Acre (3 yr av)
Bowman	25	June 18	11.3	50.4	87.6	65.2
Gallatin	26	June 19	9.1	50.1	91.0	66.0
Hazen	30	June 19	11.1	45.8	121.0	73.4
Morex	29	June 17	10.4	45.7	89.6	58.0
Robust	30	June 19	10.3	48.4	120.0	72.8
Excel (M52)	27	June 19	9.3	47.2	120.5	74.3
B1602	29	June 20	10.8	48.0	112.6	68.0
B1603	27	June 18	12.2	46.9	97.4	--
Stark (ND 9866)	28	June 18	10.6	49.5	88.8	62.7
Stander (M-64)	27	June 19	10.8	46.6	117.5	--
ND 11055	28	June 18	9.6	47.2	114.7	--
EXB2912	31	June 20	10.3	46.5	122.5	--

LSD(5%) - 11.6 Bu/A C.V.- 10.0% Mean - 106.9

*Percent protein determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded April 15 and harvested August 18, 1992.

Winter Barley

Objective: To observe and compare growth characteristics, grain quality, and grain yield of varieties and composites of winter barley.

Procedure: Fourteen entries of winter barley were seeded in fallow on September 16, 1991. The entries consisted of six named varieties, and eight composites from South Dakota. Each composite was composed of plants which were selected for deep setting crowns. Crown depth is associated with winter survival because those genotypes with naturally buried crowns most frequently survive severe winter conditions.

Results: At seeding time the surface soil was dry with moisture at seeding depth. Germination was fair with fall stands ranging from 85% to 90%. The stands which were obtained in the fall were severely reduced from winterkill. Drastic temperature change was experiencd in late October. This was followed by a winter with little moisture and very warm temperatures. The low winter survival undoubtedly was the result of both drought and early growth initiation.

Grain yield was low as the result of low plant population. Grain quality was very poor with low test weights. However, grain yield was 50% greater than the four year average which includes 1992. The data are reported in Table 45.

Table 45. Winter Barley Variety Trial - Pennington County (Wall), 1988-92.

Variety	Percent Stand 11/91	Percent Stand 4/92	Days to Heading*	Height Inches	Percent Protein**	Test Wt. (Lbs/Bu)	Grain Yield-Bu/A 1992	Grain Yield-Bu/A (4 yr av)
Hitchcock	90	66	147	30	11.5	46.3	70.1	48.4
Kearney	88	41	142	32	11.6	41.1	65.6	43.6
Dundy	89	54	145	27	10.7	40.8	54.7	46.8
Herb	80	59	149	36	10.3	38.8	44.5	38.3
Nebar	88	43	148	39	12.6	36.5	42.6	32.3
Composite 10	90	54	142	34	11.8	38.2	39.2	39.9
Composite 250	88	23	144	34	10.9	40.1	38.9	36.0
Sprinter	89	10	150	29	11.8	43.2	37.7	21.0
Composite 295	86	56	145	31	10.1	36,9	34.7	34.4
Composite 142	89	38	147	34	10.7	38.2	33.9	41.9
Composite 308	89	61	147	36	11.6	41.8	33.5	30.6
Composite 129	86	38	143	38	10.1	40.7	31.2	38.9
Composite 223	85	39	147	31	10.9	38.5	27.6	31.7
Composite 307	89	44	142	34	9.3	39.4	21.1	31.8

LSD(5%) - 34.1 Bu/A Mean - 41.1

*Days to Heading indicates days from January 1.
**Percent protein was determined with a Technicon 300 InfraAnalyzer.

NOTE: Plots were seeded September 16, 1991 and harvested July 24, 1992. Weeds were controlled with Ally at 1/10 oz/A. plus 2,4-D at 1/2 lb/A.

GRAIN CROPS

Grain Sorghum

Objective: To compare the performance of various grain crops for yield and other agronomic characteristics.

Jones County

Thirty-two grain sorghum hybrids were seeded near Draper in eastern Jones county. Plant populations were established at 1.3 plants per square foot, or 58,000 plants per acre. Stand was good and plants were healthy. The area received above normal precipitation with below normal temperatures during June and July. Growing degrees were inadequate for normal growth and maturity. The first killing frost did not occur until late September, However, most of the seeds were still in the milk to hard dough growth stage. Harvesting was completed in mid-October. The yield and other data are listed in Tables 46 and 47.

Table 46. Grain Sorghum Hybrid Variety Trial - Jones County (Draper), 1991-92.

Brand and Variety	Maturity (1-5)*	Height (Inches)	Percent Moisture	Test Wt (Lbs/Bu)	Grain Yield-Bu/A 1992	Grain Yield-Bu/A (2yr av)
Keltgen 570	2.1	40	13.2	49.7	49.1	--
Pioneer 894	2.7	39	12.7	51.2	42.4	58.9
Funks 251	3.1	42	12.3	51.3	40.7	--
Pioneer 8925	2.0	43	11.5	51.5	40.6	--
Pioneer 8950	2.0	42	11.7	49.6	40.3	--
Pioneer 8855	1.9	40	10.7	50.2	40.2	56.4
Keltgen 530	3.1	42	11.0	48.5	37.4	--
Agripro 3280	2.1	41	9.7	48.2	36.3	58.8
Keltgen 560	3.0	42	9.2	45.8	33.9	--
Wilson 512	2.3	42	8.5	43.8	32.8	61.2
Pioneer XS-902	2.3	41	10.0	47.2	26.6	49.4
Dahlgren 33B	3.4	44	10.6	46.0	25.8	51.0
Pioneer 8877	2.5	43	10.1	47.2	24.2	42.4
Horizon 45G	2.5	41	9.0	42.4	21.3	--
Horizon 28G	2.2	42	11.5	43.0	20.1	--
Wilson 515	2.9	43	--	39.3	17.9	--
Horizon 200Y	3.2	40	8.6	35.9	9.8	--
Agripro 9250	2.2	42	9.9	31.8	6.2	--
Horizon 76G	2.9	41	--	34.0	2.2	--

LSD(5%) - 6.7 Bu/Acre C.V. - 14.9% Mean - 28.8

*Maturity Scale: 1-Mature, 2-Dough, 3-Milk, 4-Pollinating, 5-Not Headed.

NOTE: Plots were seeded in 30 inch rows with a Buffalo no-till seeder on May 27, and were harvested with a Wintersteiger plot combine on October 14, 1992. Maturity observation was made on September 24. The first killing frost did not occur until after September 27, 1992.

Table 47. Grain Sorghum Hybrid Variety Trial (CPT) - Jones County (Draper), 1991-92.

Brand and Variety	Maturity (1-5)*	Height (Inches)	Percent Moisture	Test Wt (Lbs/Bu)	Grain Yield-Bu/A 1992	Grain Yield-Bu/A (2yr av)
Dekalb X-218	2.3	41	11.9	50.2	53.7	--
Dekalb DK28E	2.2	43	11.8	50.0	51.9	62.6
Dekalb X-109	2.2	42	11.1	48.2	39.7	56.1
Cargill 577	3.1	39	10.1	48.4	36.8	57.4
Dekalb DK18	2.4	41	10.0	46.2	35.6	49.0
Asgrow Madera	3.1	40	11.0	49.6	34.6	61.0
Dekalb X-117	2.4	42	10.4	43.3	34.4	--
NK X-8803	2.5	40	9.5	44.9	28.7	52.0
SIGCO 1061	2.8	41	12.3	44.8	24.3	--
Stine S68BZ	2.1	38	9.7	45.8	21.5	--
Stine S56R	2.5	41	10.2	46.5	19.9	--
Cargill X-11733	1.4	42	7.7	37.5	18.0	--
NK KS383Y	2.6	40	9.2	31.4	8.0	--
LSD(5%) - 6.4 Bu/Acre		C.V. - 14.2%		Mean - 31.3		

*Maturity Scale: 1-Mature, 2-Dough, 3-Milk, 4-Pollinating, 5-Not Headed.

NOTE: Plots were seeded in 30 inch rows with a Buffalo no-till seeder on May 27, and were harvested with a Wintersteiger plot combine on October 14, 1992. Maturity observation was made on September 24. The first killing frost did not occur until after September 27, 1992.

Pennington County

Twenty-six grain sorghum hybrids were seeded near Wall in eastern Pennington county. Plant populations were established at 1.3 plants per square foot, or 58,000 plants per acre. Stands varied because of a heavy rain shower which caused soil crusting that restricted emergence. Temperatures were below normal during the growing season and precipitation was above normal. The lack of adequate heat units resulted in immature seed at first frost. The yield and other data are listed in Table 48.

Table 48. Grain Sorghum Hybrid Variety Trial - Pennington County (Wall), 1991-92.

Brand & Variety	Height (Inches	Maturity (1-5)*	Percent Lodging	Test Wt (Lbs/Bu)	Grain Yield-Bu/A 1992	(2yr av)
Pioneer 8950	32	1.7	0	51.3	23.8	--
Pioneer 894	29	1.7	0	52.4	22.8	41.6
Dekalb DK-18	31	2.6	0	45.2	22.8	46.7
Dekalb X-218	31	2.3	0	40.0	19.9	--
Dekalb 28E	28	2.2	10	42.9	19.7	--
Funks 251	27	1.3	0	43.2	17.1	--
Wilson 512	26	2.8	0	43.2	17.1	--
Keltgen 560	30	2.4	0.3	42.0	17.0	--
Keltgen 570	31	2.6	10	45.8	16.9	--
Dekalb X109	29	1.9	0	44.5	16.5	--
Pioneer 8925	30	1.5	0	50.4	15.9	--
Pioneer 8856	29	1.7	0	51.3	15.6	--
Agripro 3280	31	2.4	0	41.8	15.2	42.4
Dekalb X117	29	2.3	0	40.8	14.9	--
Cargill 577	34	2.5	0	39.8	14.9	40.4
Sigco 1061	26	1.6	0	46.2	14.6	--
Horizon 28G	31	2.9	0	37.6	7.6	--
Keltgen 530	29	3.4	0	43.5	6.7	--
Dahlgren 33B	31	3.3	0	40.3	6.5	31.9
Wilson 515	32	3.2	40	31.3	6.1	--
Horizon 45G	32	2.9	0	35.0	4.1	--
Pioneer XS902	26	2.8	0	43.0	3.8	--
Pioneer 8877	33	2.9	0	42.2	3.3	33.2
Agripro 9250	32	3.0	0	35.7	1.9	--
Horizon 200Y	31	4.0	0	30.1	1.9	--
Horizon 76G	33	3.7	0	26.6	1.0	--

LSD(5%) - 2.2 Bu/Acre C.V. - 11.2 Mean - 13.3

*Maturity Scale: 1-Mature, 2-Dough, 3-Milk, 4-Pollinating, 5-Not Headed.

NOTE: Plots were seeded in 30 inch rows with a Buffalo no-till seeder on May 28, and were harvested with a Hege plot combine on October 13, 1992. The plots were not sprayed with herbicide, but were cultivated once. Maturity observation was made on September 24. The first killing frost did not occur until after September 27, 1992.

Stanley County

Twenty-six grain sorghum hybrids were seeded near Hayes in western Stanley county on May 27. Plant populations were established at 1.3 plants per square foot, or 58,000 plants per acre. Stands were good and plants were

healthy. The plants headed at the normal time but were slow growing because of cool temperatures during August and September. The kernels of most of the varieties were in the milk-soft dough stage at the time of the first frost. Harvesting was completed in mid-October. The yield and other data are listed in Table 49.

Table 49. Grain Sorghum Hybrid Variety Trial - Stanley County (Hayes), 1991-92.

Brand & Variety	Height (Inches)	Maturity (1-5)*	Percent Lodging	Percent Moisture	Test Wt (Lbs/Bu)	Grain Yield-Bu/A 1992	Grain Yield-Bu/A (2yr av)
Keltgen 570	42	2.7	4	12.8	49.7	35.2	--
Cargill 577	45	2.8	1	9.1	47.3	33.5	33.4
Dekalb X109	42	3.0	1	---	44.2	27.8	--
Agripro 3280	45	3.3	1	8.0	47.0	27.3	29.2
Pioneer 8856	41	2.9	1	9.6	49.7	25.5	--
Dekalb DK-18	46	2.9	13	8.7	47.0	23.2	28.6
Keltgen 530	41	3.4	0	7.9	48.3	22.6	--
Pioneer 8950	39	2.9	1	9.3	48.4	21.7	--
Dekalb X218	49	3.0	13	7.1	46.8	21.7	--
Wilson 512	41	3.2	0	8.0	44.9	21.6	--
Pioneer 8925	40	2.9	1	7.7	48.6	21.4	--
Dekalb 28E	37	3.6	0	7.4	42.5	19.9	--
Dekalb X117	42	3.0	3	7.2	43.2	19.7	--
Keltgen 560	36	3.2	0	7.3	44.0	18.4	--
Dahlgren 33B	41	3.1	0	8.1	44.8	16.5	27.7
Pioneer XS902	43	3.4	0	6.7	48.5	15.6	--
Pioneer 8877	42	2.9	0	5.8	46.8	13.1	--
Wilson 515	44	3.5	0	6.4	42.0	10.5	--
Horizon 28G	39	3.6	0	12.0	45.6	10.2	--
Pioneer 894	38	2.9	45	11.7	47.1	9.9	21.1
Funks 251	37	3.7	1	7.9	48.2	8.8	--
Horizon 45G	45	3.9	0	8.6	41.0	7.2	--
Horizon 200Y	43	3.8	0	12.1	41.4	6.6	--
Horizon 76G	41	4.0	0	---	41.2	3.4	--
Agripro 9250	42	3.9	0	8.8	44.8	3.2	--
Sigco 1061	39	4.0	0	11.8	43.3	2.5	--

LSD(5%) - 4.6 Bu/Acre C.V. - 19.2 Mean - 17.2

*Maturity Scale: 1-Mature, 2-Dough, 3-Milk, 4-Pollinating, 5-Not Headed.

NOTE: Plots were seeded in 30 inch rows with a Buffalo no-till seeder on May 28, and were harvested with a Hege plot combine on October 14, 1992. Maturity observation was made on September 16. The first killing frost did not occur until after September 27, 1992.

Millet Trials

Bennett County

Procedure: Millets for grain production were seeded near Martin in June 1992. Soil moisture was adequate for germination and emergence. The plots were harvested on September 29.

Table 50. Millet Grain Trial - Bennett County (Martin), 1992.

Crop & Variety	Seed Color	Height (Inches)	Test Wt. (Lbs/Bu)	Yield (Bu/A)	Yield (Lb/A)
Proso Millet					
Minsum	White	37	56.9	50.0	2498
Dawn	White	34	56.2	47.9	2396
Sunup	White	35	55.8	44.5	2223
Rise	White	36	56.1	43.9	2196
Minco	White	38	56.8	42.0	2099
Cerise	Red	38	58.9	37.6	1879
Foxtail Millet					
Manta	Orange	32	55.1	62.7	3133
Siberian	Orange	28	54.3	59.6	2979
German	Golden	36	53.3	48.5	2426
LSD(5%) - 5.8 Bu/A		C.V. - 8.8%		Mean - 48.5	2425

Pennington County

Procedure: Millets for grain production were seeded near Wall in June 1991. Soil moisture was adequate for germination and emergence. The plots were harvested on OCtober 13.

Table 51. Millet Grain Trial - Pennington County(Wall), 1991.

Crop & Variety	Seed Color	Date of Heading	Test Wt. (Lbs/Bu)	Yield (Bu/A)	Yield (Lbs/A)
Proso Millet					
Minsum	White	July 30	55.4	30.8	1539
Sunup	White	July 31	57.4	27.1	1355
Dawn	White	July 31	56.2	26.7	1333
Rise	White	July 31	56.7	24.8	1237
Minco	White	July 30	55.9	17.2	861
Cerise	Red	July 30	57.6	13.7	683
Foxtail Millet					
Manta	Orange	--	54.2	28.1	1404
Siberian	Orange	--	54.8	25.8	1290
German	Golden	--	45.0	13.5	673
LSD(5%) - 4.8 Bu/A		C.V. - 14.3%		Mean - 23.1	1153

OILSEED CROPS

Canola

Objective: To evaluate Canola for adaptation to western South Dakota.

Bennett County

Location: Airport Farm, at Martin in Bennett County.

Procedure: The variety Westar was seeded in 8 inch rows April 8, 1992. The soil was fallowed during the previous year. Treflan was applied for weed control at the rate of 1 pound per acre and incorporated with a disc harrow. Germination was irregular and spotty but improved after rain was received. Final stand was excellent but plants differed in stage of growth because of differences in germination. Plants were tall and vigorous and had good seed set. A lack of uniformity resulted in early maturing seed shattering before late maturing seed was ready for harvest. The plots wer not harvested.

Pennington County

Location: Rod Renner farm near Wall in eastern Pennington county.

Procedure: Five varieties of Canola were seeded in 8 inch rows on April 16, 1992. The soil had been fallowed during the previous summer. Treflan was applied for weed control at the rate of 1 pound per acre and incorporated with a disc harrow. Flowering was initiated in mid-June. The plots were harvested with a Hege plot combine on September 9. Harvesting was completed when the pods were mature and some shattering had occurred. The seed was seived from the empty pods, and dried before weighing. The trial data are reported in Table 52.

Results:

TABLE 52. Canola Variety Yield Trial - Pennington County (Wall), 1992.

Variety	Percent Stand	Height (Inches)	Test Wt (Lbs/Bu)	Seed YIeld (Lbs/Acre)
AG007	58	41	48.5	383
Alta	65	36	50.2	663
Global	80	36	50.6	650
Legend	83	34	50.0	598
Westar	91	35	50.6	960
LSD(5%) - 260 lbs/a		C.V. - 26%		Mean - 651

Discussion: Seedling emergence was delayed by lack of soil moisture. Final stands were uniform. The flowering period occurred in late June. Seed set was good but seed was very small. Some shattering occurred before harvest.

Flax

Objective: To evaluate the adaptation of Flax varieties in western South Dakota.

Procedure: Eight varieties of flax were seeded in a replicated trial at Ralph on April 22, 1992. The trials had good germination and emergence. Plot size was 4 feet by 25 feet with four replications. Starter fertilizer (12-41-0 #/A) was applied at the time of seeding. Harvesting was completed with a small plot combine. The trial data are listed in Table 53.

Results:

Table 53. Flax Variety Trial - Harding County (Ralph), 1991-92.

Variety	Seed Color	Height (Inches)	Test Weight (Lbs/Bu)	Seed Yield-Bu/Acre 1992	(2 yr av)
Omega	Yellow	23	54.4	37.2	29.6
Prompt	Brown	21	54.1	33.8	27.2
Clark	Brown	22	55.4	33.6	26.4
Verne	Brown	25	53.9	33.1	25.0
Brown	Brown	19	53.9	33.1	22.8
Neche	Brown	24	53.1	30.7	24.4
Day	Brown	23	53.8	27.8	21.9
Culbert 79	Brown	23	54.8	24.3	20.9

LSD(5%) - 3.5 Bu/Acre C.V. - 7.6% Mean - 31.4

NOTE: Plots were seeded April 22, 1992 and harvested October 9, 1992.

Discussion: The flax had good uniform germination and emergence. Weeds were not serious with only a few Kochia, Foxtail, and Wild oat plants scattered throughout the area. The flowering period extended over a long period with flowers still present in mid-August. Harvest was delayed until early October when all of the seeds were mature. Yields were 50% greater than the 3 year average.

Safflower Varieties

Objective: To evaluate the adaptation of safflower varieties in western South Dakota.

Bennett County

Procedure: The field, fallowed in 1991, was disked in the early spring and had 1 pound per acre of Treflan applied and incorporated with a harrow. The plots were seeded on April 8, 1992. Seeding was done with a plot seeder having disc openers and 8 inch row spacing. Seeding rate was 30 pounds per acre. Plot size was 4 feet by 25 feet. The stand was excellent with few weeds. Harvesting was completed on September 29, 1992.

Results:

Table 54. Safflower Variety Trial - Bennett County (Martin), 1992.

Variety	Stand Percent	Height (Inches)	% Oil Content*	Test Wt. (Lbs/Bu)	Seed Yield (Lbs/Acre)
S-317**	35	31	36.4	36.3	2206
S-541	51	31	38.8	37.1	2063
Montola 2000**	83	26	35.8	38.6	2010
Girard	58	33	35.7	37.4	1964
Finch	45	30	34.2	41.0	1876
S-208	40	31	36.4	37.8	1860
Centennial**	35	29	35.0	37.6	1636
Oker	11	29	38.0	35.1	1462

LSD(5%) - 237 Lbs/A C.V. - 8.4% Mean - 1867

*Oil content reported on a moisture free basis.
**High Oleic acid oil

Pennington County

Procedure: The field was fallowed in 1991. The field was disked in the early spring and had 1 pound per acre of Treflan applied and incorporated. The plots were seeded on April 16, 1992. Seeding was done with a plot seeder having disc openers and an 8 inch row spacing. Seeding rate was 30 pounds per acre. Plot size was 4 feet by 25 feet. The stand was excellent with few weeds. Harvesting was completed on September 28, 1992.

Results:

Table 55. Safflower Variety Trial - Pennington County (Wall), 1990-92.

Variety	Date of Flower	Height (Inches)	% Oil Content*	Test Wt. (Lbs/Bu)	Seed Yield-Lbs/A 1992	Seed Yield-Lbs/A (3 yr av)
S-317**	July 27	27	37.2	40.8	2592	1831
S-541	July 28	28	44.7	42.3	2500	1699
S-208	July 27	27	38.9	40.9	2379	1699
Girard	July 28	28	39.5	43.4	2262	1650
Montola 2000**	July 25	22	37.8	40.9	2233	1207
Centennial**	Aug 1	26	--	43.2	1927	1445
Finch	July 30	25	36.9	44.4	1767	1508
Oker	July 26	26	39.9	40.2	1716	1314

LSD(5%) - 391 Lbs/A C.V. - 12.2% Mean - 1544

*Oil content reported on a moisture free basis.
**High Oleic acid oil

Perkins County

Procedure: The field was fallowed in 1991. It was tilled prior to seeding and was dry in the seeding zone. The area received 2/3 inch of rain after seeding followed by a ten day period of cool and freezing temperatures. No additional moisture was received until the middle of May. Observations made at a later date indicated that germination had occurred but the seedlings had not emerged.

Rainfall during the summer was above normal with below normal temperatures. The plots were harvested with a plot combine on October 9. The yield data are reported in Table 56.

Results:

Table 56. Safflower Variety Trial - Perkins County(Bison), 1990-92.

Variety	Percent Stand	Height Inches	% Oil Content*	Test Wt. (Lbs/Bu)	Seed Yield-Lbs/A 1992	Seed Yield-Lbs/A (3 yr av)
S-317**	86	21	34.8	35.4	967	620
Mantola 2000**	90	15	33.4	32.9	671	620
S-541	69	23	41.9	36.4	558	434
Centennial**	69	19	34.7	36.8	545	400
S-208	53	20	33.4	36.4	417	407
Girard	29	21	35.5	37.3	296	389
Finch	19	20	35.6	42.4	224	321
Oker	2	22	31.7	37.2	35	203

LSD(5%) - 142 Lbs/A C.V. - 20.8% Mean - 464

*Oil content reported on a moisture free basis.
**High Oleic acid oil.

Discussion: The three studies were grown under quite similar conditions. The trials were all on fallow soil. Weed control of all trials, except Bison, were good. The trial at Bison did not have a herbicide applied for grassy weeds, that factor, together with poor stand, resulted in a heavy cover of Stinkgrass.

Safflower is adapted to the area. The low summer humidity is desirable because of the crops low inherent resistance to foliage disease. Seeding can be done in early to mid-April. Seedlings have withstood temperatures as low as 10 degrees Fahrenheit. Flowering is normally initiated approximately 75 days after emergence, and seed set is best under hot and dry conditions with ample soil moisture.

Safflower can be grown with normal small grain planting and harvesting equipment. A seeding rate requiring 5-6 seeds per square foot, or 20 pounds of seed per acre is satisfactory for most of western South Dakota. Heavier rates, up to 30 pounds per acre, can be used to limit weed competition. It may also contribute to foliage disease if wet weather conditions are experienced. Heavier seeding rates will reduce branching and increase plant height.

Soybean Varieties

Pennington County

Objective: To evaluate the adaptation of soybean varieties to western South Dakota.

Location: Rod Renner farm north of Wall, South Dakota.

Procedure: The soybeans were planted in 8 inch rows, with 6 rows in each plot. The field had been fallowed in 1991 and was weed free. Treflan herbicide was applied at 1 pound per acre, and was incorporated with a disk prior to planting. The plants were short and lacked vigor. The plots were harvested with a small plot combine. The experimental data are given in Table 57.

Results:

Table 57. Soybean Variety Trial - Pennington County (Wall), 1991-92..

Varieties	Maturity Group	Maturity Days	Lodging Resistance	Seed Shattering*	Yield (1992)	Yield (2 yr av)
Simpson	I	-11	Good	2	7.3	9.2
Dassel	0	- 9	Good	1	6.6	11.1
Glenwood	0	-11	Good	1	6.6	10.6
Sigco HP71	0	-10	--	-	5.6	--
Hardin	I	- 1	Good	1	4.6	--

LSD(5%) - 1.8 Bu/A C.V. - 19.6% Mean - 14.1

*Shattering - indicates the percent of pods opened two weeks after maturity. Score indicates: 1 - No shattering, 5 - over 50% shattered.

Discussion: The soybean yields were not consistent with yields obtained in past research trials. The seed pods were from 2 to 3 inches above the soil surface making harvest difficult. The plants were short and lacked vigor. The cool weather during September delayed maturity. The beans were still green at harvest on October 13.

Sunflower Varieties

Objective: To evaluate the adaptation of sunflower varieties to western South Dakota.

Pennington County

Procedure: The sunflowers were seeded in 30 inch rows, with 2 rows in each plot. The field was fallowed in 1991. Treflan herbicide was applied at the rate of one pound per acre and incorporated with a disk prior to seeding. The plots were harvested with a plot combine.

Results:

Table 58. Sunflower Variety Trial - Pennington County (Wall), 1992.

Varieties	Test Wt (Lbs/Bu)	Yield (Lbs)
Sigco 475	29.0	1496
Dahlgren DO704XL	31.4	1304
Dahlgen DO855	31.9	1092
Sigco 468	33.8	1083
Sigco 458	35.5	1020
		Mean - 1200

Discussion: The sunflower yields were consistent with yields obtained in past research trials. The plants were healthy with only a few disease lesions on the heads. Insects were found on only a few of the plants and were not severe enough to require control.

Winter Wheat Starter Fertilizer Studies

Objective: Evaluate the effect of starter fertilizer on winter survival, plant height, grain quality, and yield of hard red winter wheat.

Introduction: The use of fertilizer to increase and stabilize production, by maintaining soil nutrient level, was first stated in the literature beginning in the mid-nineteenth century. A German chemist, experimented on his farm by adding mineral salts to increase the yields. He later became known as the father of agricultutal chemistry. Over the years various aspects of "chemical manure" have been studied, such as: method and time of application, source of nutrients, and rate of application.

These studies were initiated to determine (1) the effect of starter fertilizer on winter survival, (2) the effect on yield, as a result of winter survival, and (3) the effect on grain quality.

Procedure: Seven sites were selected in conjunction with area winter wheat variety trials. The treatments consisted of liquid starter fertilizer containing nitrogen and phosphorus (10-34-0), plus granular fertilizer containing phosphorus and potassium. All nutrients were applied at a level below where germination would be damaged.

Seeding was completed during the period September 13-18, 1991. Seeding rate was established at 60 pounds per acre and was controlled by prepackaging the seed. The seeded areas were 5 feet wide and were trimmed to a 25 feet length prior to harvest with a self-propelled plot combine.

Bennett County

The hard red winter wheat variety, Thunderbird, was seeded in fallow soil at Martin on September 163, 1991. All nitrogen and phosphorus was applied in liquid form. The phosphorus as 0-41-0 and all potash were applied as granules, at the rate specified in Table 59. The total nutrients present in the soil was in excess of the amount needed for the wheat to produce a grain yield of 49 bushels per acre.

TABLE 59. Starter Fertilizer Demonstration with Hard Red Winter Wheat - Bennett County (Martin), 1991-92.

Treatment	Percent Stand* 11/91	Percent Stand* 5/92	Percent Moisture	Percent Protein**	Test Wt (Lbs/Bu)	Grain Yield-Bu/A 1992	Grain Yield-Bu/A (2 yr av)
0- 0- 0	90	55	24.3	13.6	48.0	20.2	45.6
12- 0- 0	89	43	17.2	12.8	51.6	22.4	--
0-41- 0	90	19	26.2	13.6	49.2	16.7	--
0- 0-20	90	35	32.7	13.4	47.6	18.5	--
12-41- 0	88	19	23.7	12.3	49.1	18.6	44.7
12-41-20	88	19	35.2	13.5	48.0	20.6	45.1

LSD(5%) - 3.4 Bu/A C.V. - 11.8% Mean - 19.5

*Percent stand determined by visual observation.
**Percent protein determined with a Technicon 300 InfraAnalyzer.
NOTE: Plots were seeded on September 16, 1991 and harvested August 5, 1992.

(Table 59 Continued)
Soil Analysis Data:

Nutrient	Pounds per Acre Nitrogen	Phosphorus	Potash	Sulfur
In Soil	147	64	2090	84
Pounds Added*	12	41	20	0
Required for 49 Bu Yield	118	40	275	12

*Added pounds of nutrient indicated only to those plots receiving a specific treatment.

Discussion:
Fall stands were good and uniform. Winterkill varied with fertilizer application but was severe in all treatments. Extreme warm weather in December and January with limited moisture resulted in death by dessication. Surviving plants produced numerous tillers with large heads. The lack of available moisture in early June resulted in early maturity from drought. High moisture content at harvest was the result of late maturing tiller heads.

Fall River County

The hard red winter wheat variety, Thunderbird was seeded in fallow soil at Oelrichs on September 14, 1991. The rate of application is specified in Table 60. The total fertilizer applied raised the nutrient content in the soil to the yield goal level of 40 bushel per acre. Plots were harvested on July 24.

TABLE 60. Starter Fertilizer Demonstration with Hard Red Winter Wheat - Fall River County (Oelrichs), 1990-91.

Treatment	% Stand* 11/90	5/91	Date of Heading	Height (Inches)	Percent Protein**	Test Wt (Lbs/Bu)	Grain Yield-Bu/A 1991	(2 yr av)
0- 0- 0	88	93	May 22	38	9.6	56.0	62.2	62.2
12- 0- 0	86	92	May 21	38	11.0	56.7	62.8	--
0-41- 0	86	91	May 20	37	9.5	55.3	59.6	61.0
0- 0-20	87	94	May 22	38	10.0	55.7	59.1	60.2
12-41- 0	87	93	May 20	38	10.1	56.2	65.8	--
12-41-20	83	92	May 21	37	11.5	56.4	64.0	--

LSD(5%) - 3.9 Bu/A C.V. - 4.1% Mean - 62.3

*Percent stand determined by visual observation.
**Percent protein determined with a Technicon 300 InfraAnalyzer.

(Table 60 Continued)
Soil Analysis Data:

Nutrient	Pounds per Acre Nitrogen	Phosphorus	Potash	Sulfur
In Soil	104	30	1540	88
Pounds Added*	12	41	20	0
Required for 40 Bu Yield	96	40	275	10

*Added pounds of nutrient indicated only to those plots receiving a specific treatment.

Discussion: Good fall moisture conditions resulted in good stands. Absence of severe weather conditions resulted in high winter survival. Precipitation during the spring and stored soil moisture contributed to excellent yields. Weights per bushel were slighty below normal because plots were harvested before they were completely mature. The advantage of starter fertilizer is not exhibited when plants are not stressed. The data are reported in Table 60.

Harding County

The hard red winter wheat variety, Thunderbird, was seeded in fallow soil at Ralph on September 18, 1991. All nitrogen and phosphorus combinations were applied in liquid form. Phosphorus (0-41-0) and potash (0-0-20) were applied as granules, at the rate specified in Table 61. The total fertilizer applied raised the nutrient content in the soil to the yield goal level of 37 bushel per acre.

TABLE 61. Starter Fertilizer Demonstration with Hard Red Winter Wheat - Harding County (Ralph), 1992.

Treatment	Percent Stand* 11/91	5/92	Height (Inches)	Percent Protein**	Test Wt (Lbs/Bu)	Grain Yield (Bu/Acre)
0- 0- 0	88	87	32	11.3	59.0	54.8
12- 0- 0	86	84	32	11.9	59.7	51.6
0-41- 0	89	87	32	11.8	58.7	56.8
12-41- 0	88	83	32	11.5	59.0	58.8
0- 0-20	88	87	30	11.3	58.6	50.4
12-41-20	86	83	32	11.4	58.5	59.6

LSD(5%) - 8.4 Bu/A C.V. - 10.2% Mean - 55.3

*Percent stand determined visually.
**Percent protein determined with a Technicon 300 InfraAnalyzer.

(Table 61 Continued)
Soil Analysis Data:

Nutrient	Pounds per Acre Nitrogen	Phosphorus	Potash	Sulfur
In Soil	68	52	1540	70
Pounds Added*	12	41	20	0
Required for 40 Bu Yield	89	40	275	10

*Added pounds of nutrient indicated only to those plots receiving a specific treatment.

Discussion:
Soil nutrient levels at this site were sufficient to produce the anticipated yield goal under normal moisture conditions. Total rainfall for the year was 0.72 inches below normal, with a usable rainfall during the spring growing season of 6.32 inches. Average air temperatures were above normal from August through June, but were below normal in July. Fall stand notes show a reduced emergence because of an early soil moisture shortage. Winterkill was negligible. Yields were increased by the addition of phosphorus fertilizer. The data are reported in Table 61.

Meade County
(Bear Butte Valley)

The hard red winter wheat variety, Thunderbird, was seeded in fallow soil at Bear Butte on September 13, 1991. All nitrogen and phosphorus combinations were applied in liquid form. The phosphorus as 0-41-0 and potash 0-0-20 were applied as granules. The nutrient content of the soil was above that required for a 40 bushel yield.

TABLE 62. Starter Fertilizer Demonstration with Hard Red Winter Wheat - Meade County (Bear Butte Valley), 1991-1992.

Treatment	Percent Stand* 11/91	5/92	Date of Heading	Percent Protein**	Test Wt (Lbs/Bu)	Grain Yield-Bu/A 1992	(2 yr av)
0- 0- 0	91	93	May 23	14.2	58.5	44.6	35.0
12- 0- 0	89	90	May 23	14.0	59.1	38.7	--
0-41- 0	91	91	May 22	12.0	58.7	45.2	37.3
0- 0-20	89	90	May 23	11.9	59.1	40.6	--
12-41- 0	89	86	May 22	14.2	58.2	36.4	32.9
12-41-20	88	88	May 23	13.3	58.4	40.4	33.9

LSD(5%) - 5.8 Bu/A C.V. - 6.9% Mean - 41.0

*Percent stand determined by visual observation.
**Percent protein determined with a Technicon 300 InfraAnalyzer.
NOTE: Plots were seeded September 13, 1991 and harvested July 20, 1992.

(Table 62 Continued)
Soil Analysis Data:

Nutrient	Pounds per Acre Nitrogen	Phosphorus	Potash	Sulfur
In Soil	153	88	1760	104
Pounds Added*	12	41	20	0
Required for 40 Bu Yield	96	40	275	10

*Added pounds of nutrient indicated only to those plots receiving a specific treatment.

Discussion: Soil nutrient levels at this site were sufficient to produce the anticipated yield goal under normal moisture conditions. Total rainfall for the year was 1.5 inches below normal, with a usable rainfall for the spring growing season of 7.1 inches.

Fall emergence was slightly reduced and was uneven. Precipitation during the fall and winter was limited, and temperatures were above normal. Winterkill was very minor. Spring growth rate was slow but increased as precipitation was received. Plant growth increased dramatically in June with a potential for a high yield of quality grain. However, lack of rain in early July resulted in droughty conditions. Grain yields, were average as were test weights and protein content. The data are reported in Table 62.

Pennington County

The hard red winter wheat variety, Thunderbird, was seeded in fallow soil near Wall in eastern Pennington county on September 16, 1991. All nitrogen and phosphorus combinations were applied in liquid form. The phosphorus (0-41-0) and potash (0-0-20) treatments were applied as granules. All fertilizer was applied at the rate specified in Table 63. The total fertilizer applied raised the nutrient content in the soil to the yield goal level required for a yield of 45 bushel per acre.

TABLE 63. Starter Fertilizer Demonstration with Hard Red Winter Wheat - Pennington County(Wall), 1991-92.

Treatment	Percent Stand* 11/91	5/92	Height (Inches)	Percent Protein**	Test Wt (Lbs/Bu)	Grain Yield-Bu/A 1992	(2 yr av)
0- 0- 0	89	90	36	9.5	58.2	53.6	46.0
12- 0- 0	89	89	36	9.9	58.7	54.8	--
0-41- 0	89	90	33	10.6	59.0	57.9	54.6
0- 0-20	85	89	32	10.1	58.2	51.5	--
12-41- 0	89	88	35	9.9	59.0	58.8	55.1
12-41-20	89	90	34	10.5	59.5	60.5	55.8

LSD(5%) - 5.8 Bu/Acre C.V. - 6.9% Mean - 56.2

*Percent stand determined visually.
**Percent protein determined with a Technicon 300 InfraAnalyzer.
NOTE: Plots were seeded September 16, 1991 and harvested July 24, 1992.

(Table 63 Continued)
Soil Analysis Data:

Nutrient	Pounds per Acre Nitrogen	Phosphorus	Potash	Sulfur
In Soil	115	66	1870	98
Pounds Added*	12	41	20	0
Required for 45 Bu Yield	108	45	350	12

*Added pounds of nutrient indicated only to those plots receiving a specific treatment.

Discussion:
The site of this experiment had a dry surface soil but moisture was present at seeding depth. Fall emergence, averaging 89%, was less than normal. Subnormal fall and winter precipitation, and above normal temperatures caused little winterkill. Spring season temperatures were above normal but plant growth was slow. During late June and July rain showers and cool tmperatures favored growth. The result was good grain yield. The application of starter fertilizer did not cause significant yield increases but there were increases due to fertilizer application. Long-time records indicate an eight to twelve bushel yield increase can be realized by use of starter fertilizer.

Perkins County

The hard red winter wheat variety, Thunderbird, was seeded in fallow soil at Bison on September 17, 1991. All nitrogen and phosphorus combinations were applied in liquid form. The phospohorus (0-41-0), and potash (0-0-20), were applied as granules. The fertilizer was applied at the rate specified in Table 64. The total fertilizer applied raised the nutrient content in the soil to the yield goal level of 35 bushel per acre.

TABLE 64. Starter Fertilizer Demonstration with Hard Red Winter Wheat - Perkins County(Bison), 1991-92.

Treatment	Percent Stand* 11/91	4/92	Date of Heading	Percent Protein**	Test Wt (Lbs/Bu)	Grain Yield-Bu/A 1992	(2 yr av)
0- 0- 0	74	8	June 8	12.6	55.8	22.7	20.8
12- 0- 0	81	11	June 8	12.0	54.7	26.8	--
0-41- 0	78	8	June 6	12.4	52.4	21.7	22.6
0- 0-20	80	17	June 7	12.8	53.9	21.8	--
12-41- 0	80	16	June 6	12.9	49.2	15.2	20.5
12-41-20	81	3	June 6	13.3	49.8	14.9	19.2

LSD(5%) - 4.5 Bu/A C.V. - 14.3% Mean - 20.5

*Percent stand determined visually.
**Percent protein determined with a Technicon 300 InfraAnalyzer.
NOTE: Plots were seeded September 17, 1991 and harvested Auguast 12, 1992.

(Table 64 Continued)
Soil Analysis Data:

Nutrient	Pounds per Acre Nitrogen	Phosphorus	Potash	Sulfur
In Soil	49	26	990	56
Pounds Added*	12	41	20	0
Required for 35 Bu/A Yield	84	40	275	9

*Added pounds of nutrient indicated only to those plots receiving a specific treatment.

Discussion: The winter wheat starter fertilizer study at Bison was seeded in late September 1991. The seedbed was loose with some topsoil moisture available. Subsoil moisture was available to a depth of 36 inches. Fall stands averaged 79% but early spring stands were less than 15%. As moisture became available in May more plants became visible although they lacked vigor. A frost in late May destroyed all early heads. Late growing tillers produced harvestable grain. Yield differences shown in Table 64 reflect winter survival.

Reduced Tillage Crop Rotation Study

Objectives: (1). To maintain at least thirty percent residue cover on the soil surface at all times. (2). Evaluate the net income from each rotation each year. (3). Evaluate changes in the soil tilth, weeds present, and disease occurrence.

Experimental Design: The study includes five cropping sequences which vary in duration from two to five years. The cropping sequences, initiated in 1987 have been maintained, and are replicated four times in a randomized complete block design.

Funding: The study is supported by funds from the South Dakota Wheat Commission, and the Agricultural Experiment Station and Cooperative Extension Service, South Dakota State University.

Rotations:

A. Winter Wheat / Summer Fallow.
   A combination of herbicides and tillage are being used to maintain a 30% soil residue cover.

B. Winter Wheat / Millet.
   A continuous cropping rotation planted no-till. It maintains excellent soil protection. Herbicides are used to control weeds.

C. Winter Wheat / Milo / Millet / Barley.
   A continuous cropping system that includes 1 year of row crop and 3 years of small grains.

D. Winter Wheat / Milo / Oats / Winter Wheat / Summer Fallow.
   The longest rotation that includes reduced tillage methods of growing small grains and row crop, and includes a summer fallow period.

E. Winter Wheat / Milo / Summer Fallow.
The standard Ecofallow rotation which has shown significant yield increases over conventionally planted grain sorghum in past research.

Comments: The survival of winter wheat in the spring of 1992 was directly related to the amount of protective cover during the previous fall and winter. The winter wheat seeded no-till into stubble had an excellent stand in May of 1992. The frost on May 28 injured the wheat heads which resulted in very low yields. The milo, planted May 27, 1992, had a good stand. The growing season did not have enough heat units to mature the crop. An economic comparison of the rotations during the 1992 season favored Rotation B (Winter wheat-Millet). The yields were not much greater in this rotation but the price of millet went to a 4 year high of 7 cents per pound, resulting in a greater return. Rotation A (Winter wheat-fallow) has consistently had a greater return over the last three years, even though it has not always netted the most money. Rotations containing milo have performed very poorly during the past 2 growing seasons.

The goal of maintaining thirty percent residue cover after planting has been achieved in most rotations. Rotations A, D, and E have summer fallow periods in each. It has been difficult to maintain the residue during the summer fallow period even with only 1 tillage operation.

The importance of crop rotations regarding weed control was pointed out this season. The Barley, Millet, and Oats crops were not sprayed with a herbicide because there were no weeds present in the plots.

Results:

TABLE 65. Yield of Crops in Reduced Tillage Rotation Study, Stanley County (Hayes), 1992.

Rotation	Crop	Yield (Bu/A)	Crop	Yield (Bu/A)	Crop	Yield (Bu/A)	Crop	Yield (Bu/A)
A	S.Wheat	47.3	Fallow					
B	W.Wheat	19.9	Millet	43.7				
C	W.Wheat	18.5	Milo	4.7	Millet	37.6	Barley	57.2
D	S.Wheat (Fallow)	47.2	Milo	5.4	Oats	57.4	W.Wheat (Stubble)	16.1
E	S.Wheat	45.5	Milo	4.9	Fallow			

TABLE 66. Production Costs of Reduced Tillage Crop Rotation Study, Hayes, 1991

Rotation A: Winter Wheat / Summer Fallow

Management Input - 1991 Winter wheat after Fallow	Cost/Acre
Reduced Tillage Seeding-Winter Wheat, September 1991	$ 7.85
Winter Wheat Seed - var. Arapahoe - 1 bushel/A	5.00
Starter Fertilizer - (10-34-0) - 6 gal./A	7.55
Herbicide: (Roundup - .3125 lb/A + Additives)	5.41
Reseeding and Spring Wheat seed - var. Prospect	15.40
Lindane Seed Treatment for Spring Wheat	0.45
Harvest - Spring Wheat - 47.3 bu/A	17.46
Land Charges - 1992 - (Taxes,etc)	17.00
Soil Testing & Analysis - 1992	0.40
Total Cost of Spring Wheat Production - 1992	$76.52

Management Input - 1992 Summer Fallow	Cost/Acre
Atrazine - .75 lb/A; 2,4-D - .50 lb/A; COC - 1 qt/A	$10.01
Roundup - .375 lb/A + Add; Banvel - .125 lb/A; May 92	8.17
Roundup - .3125 lb/A + Add; 2,4-D - .75 lb/A; July 92	7.49
Roundup - .3125 lb/A + Add; 2,4-D - .5625 lb/A; August 92	6.97
Land Charges - 1992 - (Taxes,etc)	17.00
Soil Sampling & Analysis	0.40
Total Cost of Summer Fallow - 1992	$50.04

Economic Summary - Winter Wheat / Fallow - 1991

Deficiency Payment	$ 13.65	Prod. Cost of Wheat	$ 76.52
Sale of Wheat	155.62	Cost of Fallow	50.04
Total Income	$169.27	Total Cost of Production -	$108.12

Income / year (1992)	$21.36
Income / year Avg(91-92)	$24.01
Income / year Avg(90-92)	$33.27

Discussion: In Rotation A, Arapahoe Winter Wheat seeded into reduced tillage fallow had 80% winterkill during the winter & early spring. After seeding in the fall there was an approximate 30% residue cover. The plots were overseeded with Prospect Spring Wheat in early April 1992. The spring wheat was drought stressed until late May, when the lower leaves were starting to fire. As the result of good growing conditions in June & July, the spring wheat was able to produce an excellent yield. The net return per acre was reduced by the expense of reseeding with spring wheat. The long-term results would indicate 3 things. 1) Conservation compliance of 30% residue cover is difficult to achieve. The fallow plots only had one tillage during June in 1989, 1990, & 1991. 2) Good yields can be obtained with reduced tillage Wheat / Summer Fallow rotation. 3) The net return per acre is modest but stable from this rotation.

Table 66 continued on Page 66.

Table 66 continued from page 65

Rotation B: Winter Wheat / Proso Millet

Management Input - 1992 Winter wheat after Millet	Cost/Acre
No-till seeding - Winter Wheat - September 1991	$ 7.85
Winter Wheat Seed - var. Arapahoe, 1 bushel/A	5.00
Starter Fertilizer - (10-34-0) - 6 gal/A	7.55
Nitrogen Fertilizer -(28-0-0) - 16.7 gal/A (50#N) - March 92	13.09
Herbicide: (Ally - .1 oz/A + 2,4-D - .25 lb/A)	5.71
Harvest Winter Wheat - 19.9 bu/A	12.00
Land Charges - 1992 - (Taxes,etc)	17.00
Soil Testing & Analysis	0.40
Total Cost of Production - 1992	$68.60

Management Input - 1992 Millet Crop after W. Wheat	Cost/Acre
Atrazine - .75 lb/A; 2,4-D - .50 lb/A; COC 1 qt/A	$10.01
Roundup -.3125 lb/A + Additives;	5.41
No-till planting of Rise Millet	7.85
Starter Fertilizer - (10-34-0) - 6 Gal/A	7.55
Rise Millet Seed - 20 lb/A	2.72
Lindane Seed Treatment	0.45
Harvest Millet - 47.3 bu/A	16.74
Land Charges - 1992 - (Taxes,etc)	17.00
Soil Testing & Analysis	0.40
Total Cost of Millet Production - 1992	$68.60

Economic Summary - Winter Wheat / Proso Millet

Deficiency Payment	$ 13.65	Prod. Cost of Millet	$ 68.53
Sale of Millet	152.95	Prod. Cost of Wheat	68.60
Sale of Wheat	62.68		
Total Income	$229.28	Total Cost of Production -	$137.13

Income - Net income (1992)	$46.07
Income - Net income Avg (91-92)	$35.40
Income - Net income Avg (90-92)	$36.73

Table 66 continued on Page 67

Discussion: Rotation B is being used to evaluate a no-till replacement for summer fallow. A No-till hoe drill was used to plant both winter wheat & millet. The winter wheat planted into millet stubble did not winter-kill and had an excellent stand in early spring of 1992. Freezing temperatures on May 28 killed the heads that were just emerging. The yield of 19.9 Bu/A came from

late developing heads. In past years, yield from the winter wheat planted on millet stubble has been equal to 75% of the yield of wheat planted on summer fallow. The price received for millet has ranged from 2.5 cents to 7 cents per pound. Therefore, the economics of this rotation changes from year to year. Grassy weeds became more of a problem in this rotation during 1992. Volunteer millet in winter wheat has not been a problem. The millet straw was removed from the plots to aid seeding of winter wheat. This rotation is accumulating an abundance of organic residue on the soil surface.

Table 66 continued from Page 66

Rotation C: Winter Wheat / Milo / Millet / Barley

Management Input - 1992 W. Wheat Crop After Barley	Cost/Acre
No-Till seeding - Winter Wheat - September 1991	$ 7.85
Winter Wheat Seed - var. Arapahoe, 1 bushel/A	5.00
Starter Fertilizer - (10-34-0) 6 gal/A	7.55
Herbicide: (Roundup - .3125 lb/A + additives), September 91	5.41
Herbicide: (Ally - 1/10 oz/A + 2,4-D - .25 lb/A), April 92	5.67
Harvest Winter Wheat - 18.5 bu/A	12.00
Land Charges - 1992 - (Taxes,etc)	17.00
Soil Testing & Analysis	0.40
Total Cost of Winter Wheat Production	$60.88

Management Input - 1992 Milo Crop After W. Wheat	Cost/Acre
Atrazine - 1.5 lb/A, 2,4-D -.50 lb/A, COC - 1 qt/A, Aug 91	$10.01
Roundup - .375 lb/A + Additives, Banvel - .125 lb/A - May 92	8.17
No-till seeding - Milo - May 92	7.85
Milo seed - Pioneer 894 - 3 lb/A	3.00
Starter Fertilizer - (10-34-0) - 8 gal/A	10.08
Lindane seed treatment	0.45
Harvest Milo - 4.7 bu/A - October 92	0.00
Land Charges - 1992 - (Taxes,etc)	17.00
Soil Testing & Analysis	0.40
Total Cost of Milo Production	$56.96

Management Input - 1992 Millet Crop after Milo	Cost/Acre
No-till seeding Millet - var. Rise	$ 7.85
Millet seed - 20 lb/A	2.72
Starter Fertilizer (10-34-0) 6 gal/A	7.55
Lindane seed treatment	0.45
Harvest Millet - 37.6 Bu/A	15.52
Land Charges - 1992 - (Taxes,etc)	17.00
Soil Testing & Analysis	0.40
Total Cost of Millet Production	$51.49

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Management Input - 1992 Barley Crop after Millet	Cost/Acre
No-Till Barley Seeding - Mar 92	$ 7.85
Barley Seed Var. Bowman - 2 bu/A	5.50
Starter Fertilizer - (10-34-0) - 6 gal/A	7.55
Lindane seed treatment	0.45
Harvest Barley - 57.2 bu/A	19.44
Land Charges - 1992 - (Taxes,etc)	17.00
Soil Testing & Analysis	0.40
Total Cost of Barley Production	$58.19

Economic Summary - Winter Wheat / Milo / Millet / Barley

Deficiency Payment	$ 13.65		
Sale of Wheat	58.27	Prod. Cost of Wheat	$ 60.88
Sale of Milo	0.00	Prod. Cost of Milo	56.96
Sale of Millet	131.60	Prod. Cost of Millet	51.49
Sale of Barley	108.68	Prod. Cost of Barley	58.19
Total Income	$312.20	Total Cost of Production	$227.52

Income - Net from the Rotation - 1992	$21.17
Income - Net Ave/per year - (91-92)	$16.77
Income - Net Ave/Yr - (90-92)	$16.77

Discussion: Rotation C has been no-till seeded for the past 4 years. The winter wheat had an excellent stand but was frozen on May 28. The yield obtained came from the late developing heads. The milo was planted May 27, 1992 and had an average stand. The summer was not warm enough to mature the milo crop and yields were very poor. The millet crop had bird damage but still yielded 1880 pounds per acre. The barley crop yielded 57 bushels per acre. The barley and the millet crops did not require herbicides for weed control. This points out that no-till crop rotations may not require more pesticides.

Rotation D: Winter Wheat / Milo / Oats / Winter Wheat / Fallow

Management Input - 1992 Winter Wheat After Fallow	Cost/Acre
No-till Seeding - Winter Wheat; September 1991	7.85
Winter Wheat Seed - Arapahoe - 1 bushel/A	5.00
Starter Fertilizer - (10-34-0) - 6 Gal/A	7.55
Roundup - .3125 lb/A + Additives; September 1991	5.41
Reseeding & Spring Wheat seed - var. Prospect + starter fert.	20.40
Lindane seed treatment	0.45
Harvest Spring wheat - 47.2 bu/A	17.44
Land Charges - 1992 - (Taxes,etc)	17.00
Soil Testing & Analysis	0.40
Total Cost of Spring Wheat Production	$81.50

Table 66 continued on Page 69.

Table 66 continued from Page 68.

Management Input - 1992 Milo Crop After W. Wheat	Cost/Acre
Atrazine - 1.5 lb/A - Aug 91	$ 4.80
Roundup - .375 lb/A + Add, Banvel - .125 lb/A - May 92	8.17
No-till seeding Milo - May 92	7.85
Milo seed - Pioneer 894 - 3 lb/A	3.00
Starter Fertilizer (10-34-0) - 8 gal/A	10.08
Lindane seed treatment for milo	0.45
Harvest milo - 5.4 bu/A	0.00
Land Charges - 1992 - (Taxes,etc)	17.00
Soil Testing & Analysis	0.40
Total Cost of Milo Production	$51.35

Management Input - 1992 Oats After Milo	Cost/Acre
Apply liquid fertilizer (28-0-0) at 7 gal/A (21#N)	$ 5.39
No-till seeding of oats	7.85
Oat seed var. Hytest - 2 bu/A	5.50
Starter Fertilizer (10-34-0) 6 gal/A	7.55
Lindane seed treatment for Oats	0.45
Harvest Oats - 57.4 bu/A	19.48
Land charges - 1992 - (Taxes,etc)	17.00
Soil Test & Analysis	0.40
Total Cost of Oats Production	$63.62

Management Input - 1992 Winter Wheat Crop After Oats	Cost/Acre
Roundup - .3125 lb/A + Additives - September 1991	$ 5.41
No-Till Seeding of Winter Wheat	7.85
Winter Wheat Seed - var. Arapahoe - 1 bu/A	5.00
Starter Fertilizer - (10-34-0) - 6 Gal/A	7.55
Herbicide: (Ally - 1/10 oz/A + 2,4-D - .2344 lb/A)	5.71
Harvest Winter Wheat - 16.1 bu/A	12.00
Land Charges - 1992 - (Taxes,etc)	17.00
Soil Test & Analysis	0.40
Total Cost of Wheat Production	$60.92

Management Input - 1992 Summer Fallow	Cost/Acre
Roundup - .375 lb/A + Add., Banvel - .125 lb/A - May 9	$ 8.17
Roundup - .312 lb/A + Add., 2,4-D - .5156 lb/A - July 92	6.84
Land Charges - 1992 - (Taxes,etc)	17.00
Soil Test & Analysis	0.40
Total Cost of Summer Fallow	$32.41

Table 66 continued on Page 70.

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Economic Summary - Winter Wheat / Milo / Oats / W. Wheat / Fallow

Deficiency Payment	$ 13.65		
Sale of S. Wheat	155.28	Prod. Cost of Wheat on Fallow	$ 81.50
Sale of Milo	0.00	Prod. Cost of Milo	51.35
Sale of Oats	77.49	Prod. Cost of Oat	63.62
Deficiency Payment	13.65	Cost of Fallow	32.41
Sale of W. Wheat	50.71	Prod. Cost of Wheat After Oats	60.92
Total Income	$310.78	Total Cost of Production	$289.80

Income - Net income avg -(1992)	$ 4.19
Income - Net income avg -(91-92)	$18.62
Income - Net income avg -(90-92)	$22.72

Discussion: Rotation D contains two Winter Wheat crops. The winter wheat seeded in reduced tillage winterkilled and was interseeded to Prospect Spring Wheat. The yields were good. The No-till winter wheat seeded into oat stubble did not winterkill, but the frost on May 28 killed first developed heads. The no-till seeded wheat yields were lower than expected. The milo crop was no-till seeded May 27 and had a very low yield of 5.4 bushels per acre. The oats crop was good and did not require a herbicide sprayed on it because the plots were weed free. This rotation has in the past had a good return per acre, but in the last 2 years the milo crop has been a failure.

Rotation E: Winter Wheat / Milo / Summer Fallow

Management Input - 1992 Winter Wheat After Fallow	Cost/Acre
No-till seeding of Winter Wheat - September 1991	$ 7.85
Winter Wheat seed - Arapahoe - 1 bu/A	5.00
Starter Fertilizer - (10-34-0) - 6 gal/A	7.55
No-till seeding of Spring Wheat - March 31, 1992	7.85
Spring Wheat Seed - var. Prospect 1 bu/A	5.00
Starter Fertilizer - (10-34-0) - 6 gal/A	7.55
Lindane Seed Treatment	0.45
Harvest Spring Wheat - 45.5 bu/A	17.10
Land Charges - 1992 - (Taxes,etc)	17.00
Soil Testing & Analysis	0.40
Total Cost of Spring Wheat Production	$75.75

Table 66 continued on Page 71.

Table 66 continued from Page 70.

Management Input - 1992 Milo Crop After W. Wheat	Cost/Acre
Atrazine - 2.5 lb/A - August 1991	$ 8.00
Roundup - .375 lb/A + Add., Banvel - .125 lb/A	8.17
No-till seeding of Milo (includes seed cost)	10.85
Starter Fertilizer - (10-34-0) - 8 gal/A	10.08
Lindane Seed treatment for milo	0.45
Harvest milo - 4.9 bu/A	0.00
Land Charges - 1992 - (Taxes,etc)	17.00
Soil Testing & Analysis	0.40
Total Cost of Milo Production	$54.95

Management Input - 1992 Summer Fallow	Cost/Acre
Roundup - .3125 lb/A + Add., 2,4-D - .52 lb/A - July 1992	$ 6.80
Roundup - .3125 lb/A + Add., 2,4-D - .56 lb/A - August 1992	6.93
Land Charges - 1992 - (Taxes, etc)	17.00
Soil Testing & Analysis	0.40
Total Cost of Summer Fallow - 1992	$31.13

Economic Summary - Winter Wheat / Milo / Fallow

Deficiency Payment	$ 13.65	Cost of Fallow	$ 31.13
Sale of S. Wheat	149.69	Prod. Cost of S. Wheat	75.75
Sale of Milo	0.00	Prod. Cost of Milo	54.95
Total Income	$163.34	Total Cost	$161.83

Income - Net income avg (1992)	$ 0.50
Income - Net income avg (91-92)	$ 8.11
Income - Net income avg (90-92)	$ 20.96

Discussion: In Rotation E, the past two seasons of milo have been a failure due to weather conditions. The winter wheat planted on fallow winterkilled and was reseeded to spring wheat. The expense was greater due to the interseeding of spring wheat. This is a good rotation but the past two years have resulted in very low economic returns.

Summary: The objective of maintaining adequate crop residue to be in conservation compliance has been accomplished in rotations A,B,C, and D. Rotation E has a marginal amount of milo and wheat straw residue left after the summer fallow period. There has been 20 to 30 percent soil cover after planting of the winter wheat crop. There has been no serious weed or disease problems identified in the rotations. The annual weeds have become less of a problem in all rotations except the winter wheat/millet rotation. The rotations with continuous cropping have increased the amount of crop residue on the soil surface.

COST OF INPUTS - 1992

Seed

Arapahoe	$5.00/Bu
Prospect	5.00/Bu
Rise Millet	6.80/Bu
Bowman Barley	2.75/Bu
Pio 894 Milo	1.00/Lb
Hytest Oats	2.75/Bu

Fertilizers

10-34-0	$215/Ton
28- 0-0	$144/Ton

Herbicides

Roundup 4L	$36.00/Gal
X-77 (Wetting Agent)	16.50/Gal
Ammonium Sulfate	4.90/Gal
Banvel 4L	69.69/Gal
2,4-D ester LV6	16.34/Gal
Atrazine 4L	12.42/Gal
Crop Oil	5.30/Gal
Ally (60%)	25.20/Oz
Winter Wheat	$3.15/Bu

Deficiency Payment

Winter Wheat County Average = 21 Bu

21 bu. x $.65 = $13.65/acre

Seed Treatment Chemicals

Lindane $4.80/lb. or $.30/Oz.

No-Till Planting Charges

$7.85/Acre

Land Charges

Land Value: $240/A x 7% = $17.00

Spray Application Fee

$2.50/Acre

Harvest Charges

Base is $12/A @ 20 bushels.
$.20/Bu for yield above 20 bu/A

Grain Sale Values

Spring Wheat	3.29/Bu
Proso Millet	0.07/Lb
Barley	1.90/Bu
Milo or Grain Sorghum	1.62/Bu
Oats	1.35/Bu

Winter Wheat Survival With Reduced Tillage

OBJECTIVE: To evaluate winter wheat survival in different cropping systems.

Procedure: Arapahoe was seeded September 19,1991 on fallow and on recrop plots following millet, barley, and oats. A Hoe Drill was used for seeding the plots. Liquid fertilizer (10-34-0) was applied at 6.3 gallons per acre.

TABLE 67. Winter Wheat Survival in Rotations including Fallow and Various Crops. Stanley County (Hayes), 1992.

Crop Rotation	Previous Crop	Percent Survival*	Cover % Residue
A : WWheat/Fallow	Fallow	21.3	27
B : WWheat/Millet	Millet	93.8	70
C : WWheat/Milo/Millet/Barley	Barley	92.5	90
D ¦ WWheat/Milo/Oats/WWheat/Fallow	Oats	88.8	90
D WWheat/Milo/Oats/WWheat/Fallow	Fallow	27.5	27
E : WWheat/Milo/Fallow	Fallow	21.3	20
Least Significant Difference (5% level)		- 8.8	
Standard Deviation		- 5.8	
Coefficient of Variability (%)		- 10.1	

*Survival notes were taken on March 24, 1992.

Summary: The added protection of the standing stubble on the recrop plots show a great survival advantage over wheat planted on fallow ground. Rapidly falling temperatures that occured in late October 1991 (+59 to -3) more severely affected winter wheat planted on fallow. The recropped winter wheat had more protection and did not winterkill. There was some snow cover also but not enough to protect the wheat planted on fallow.

The winter wheat seeded no-till into stubble looked very good after spring greenup. A killing frost (28 degrees) on May 28 froze the developing heads. Late tillers that headed after the frost produced the grain on these plots.

WEED CONTROL RESEARCH

Comparison of Amber and Ally in Combination with Other Herbicides

Objective: To evaluate the control of Wild Buckwheat, Common Lambsquarters, Kochia, and Tansy Mustard, using Amber or Ally in various combinations with other herbicides.

Procedure: The trial was sprayed on April 30,1992. Wild Buckwheat was at 1 leaf stage, Kochia in rosette stage, Lambsquarters 1 inch tall, & Tansy Mustard 4-6 inches tall. The winter wheat was fully tillered. Sprayer equipment included 8004 flat fan nozzles applying 20 gallons per acre with a 10 ft. boom. Temperatures during this time period were 95 degrees during the day and 65 degrees during the night.

TABLE 68. Effect of Amber, Ally, Banvel, and 2,4-D on Broadleaved Weeds in Safflower. Pennington County(Wall), 1992.

Treatment	Ounces Prod/A	Yield Bu/A	%Wibw 5/18	%Colq 5/18	%KOCZ 5/18	%Tamu 5/18	Wibw* 7/17	KOCZ* 7/17
Ally	0.1	7.1	80	89	86	93	1.5	1.8
Ally 2,4-D ester	0.1 5.33	5.6	90	94	93	95	1.8	1.8
Ally Banvel	0.1 4.0	6.4	94	93	86	95	1.8	2.0
Ally 2,4-D ester Banvel	0.1 5.33 4.0	4.2	93	95	93	95	1.5	1.0
Check	----	8.3	0	0	0	0	5.0	5.0
Amber	0.285	6.8	74	89	88	89	2.0	2.0
Amber 2,4-D ester	0.285 5.33	7.2	78	89	80	94	2.0	2.0
Amber Banvel	0.285 4.0	4.8	90	93	89	91	2.0	1.0
2,4-D amine	16.0	4.8	58	71	73	55	4.5	3.8
Banvel 2,4-D ester	2.0 5.33	5.4	88	86	80	64	3.3	2.8
LSD(5%) -		2.5	13	12	12	8	1.1	1.0
C.V. (%) -		28.0	12	11	11	7	29.3	28.5

*Rating: 1 - Excellent Control, 5 - No Control.
NOTE: Wibw - Wild buckwheat, Colq - Common Lambsquarters, KOCZ - Kochia, Tamu - Tansy mustard.

Summary: Yields were low in this trial due to Hail damage. Ally and Amber alone or with other chemicals worked equally well on control of the listed weeds.

Effect of Experimental Herbicides Treatments on Safflower

Objectives: To evaluate performance of experimental herbicide treatments for crop tolerance and weed control.

Procedure: This trial was planted to S-208 on April 28,1992 with a John-Deere grain drill in 12 inch rows at 20 pounds per acre. The trial was planted on wheat stubble ground. Herbicides were applied both pre- & post-emergence.

TABLE 69. Effects of Herbicides and Combinations on No-Till Safflower. Pennington County (Wall), 1992.

Treatment	Rate of Application (Lbs/Acre-Active)	Height-inches (7-18-92)
PREEMERGENCE		
Check	---	28.3
Dual	2.5	30.3
Dual	1.5	26.7
Treflan	1.0	26.3
Treflan 10G	1.0	31.7
Treflan + Ceramic	1.0	30.3
Prowl	1.25	30.0
Sonalan	1.1	30.7
Sonalan 10G	1.1	29.3
Acetochlor	2.0	29.3
Frontier	1.25	29.7
Gramoxone + X-77	.38 + .5%	30.7
Roundup + X-77 + AS	.38 + .5%	30.0
PREEMERGENCE & POSTEMERGENCE		
Prowl & Poast + COC	1.25 & .187 + 1 quart	28.0
POSTEMERGENCE		
Ally(.1 oz*) + X-77	.004 + .25%	25.0
Ally + X-77	.008 + .25%	26.0
Harmony Extra (.6 oz*) + X-77	.028 + .25%	16.3
Harmony + X-77	.0309 + .25%	15.0
Harmony + X-77	.0618 + .25%	14.7
Express (.33 oz*) + X-77	.0154 + .25%	14.3
Express + X-77	.0308 + .25%	12.0
Poast + COC	.187 + 1 quart	31.3
	Least Significant Difference (5%) - 3.6	

*Ounces of Product per acre.

Summary: Post-emergence applications of Harmony Extra, Harmony, & Express caused severe stunting of the S-208 variety. The trial was hailed on quite extensively and consequently wasn't harvested. The Treflan treatment is the only one currently labeled in South Dakota.

Seed Treatment of Winter Wheat

Objectives: To determine efficiency of various combinations of seed inoculants on three winter wheat varieties.

Procedure: This study was seeded on September 23, 1991. Seeding rate was 60 pounds per acre. Starter fertilizer was applied at 6.3 gallons per acre of 10-34-0.

TABLE 70. Effects of Seed Treatment on Yield and Grain Quality of Winter Wheat Pennington County (Wall), 1992.

Treatment	Ounces/Acre (Active Ingredient)	Percent Protein	Test Wt. (Lbs/bu)	Yield (Bu/A)
Arapahoe Vitavax	2.0	10.6	57.9	47.6
Arapahoe Vitavax Imazalil	2.0 0.25	11.6	59.4	44.9
Arapahoe Vitavax Imazalil	2.0 0.50	10.1	58.3	46.2
Arapahoe Imazalil	0.50	11.8	60.0	49.5
Arapahoe Control	----	14.0	59.5	40.5
Dawn Vitavax	2.0	9.7	58.4	41.3
Dawn Vitavax Imazalil	2.0 0.25	14.4	58.7	43.2
Dawn Vitavax Imazalil	2.0 0.50	10.4	59.2	40.7
Dawn Imazalil	0.50	9.4	59.3	38.7
Dawn Control	----	12.3	59.6	39.3
TAM 107 Vitavax	2.0	10.1	59.4	39.5
TAM 107 Vitavax Imazalil	2.0 0.25	11.2	59.9	41.7
TAM 107 Vitavax Imazalil	2.0 0.50	12.2	59.3	44.1
TAM 107 Imazalil	0.50	10.3	59.8	45.0
TAM 107 Control	--	11.6	58.9	43.3
Least Significant Difference (5%)			1.4	8.0
Coefficient of Variability			1.7	12.9

Summary: This trial indicates that Imazalil will control crown rot and significantly improve yield when applied to Arapahoe wheat. None of the other variety treatments resulted in significant advantages.

DISEASE CONTROL

Control of Tan Spot on Winter Wheat

Objective: To control Tan Spot on winter wheat using fungicides at various rates. To assess yield potential of the crop when these fungicides are used.

TABLE 71. Control of Tan Spot on Winter Wheat With Fungicides. - Pennington County (Wall) Jensen Farm - 1992

Fungicide Treatment	Application Rate (Oz of ai/acre)	Time of Application	Percent Protein	Test Wt (Lbs/Bu)	Grain Yield Bu/Acre
Punch	1.5	Flag Leaf	16.0	62.1	62.0
Control	---	-----	15.6	62.2	61.9
Punch	1.0	Flag Leaf	16.0	63.1	60.3
Punch	1.5	Heading	16.4	62.3	58.3
Punch	2.0	Flag Leaf	15.1	62.4	57.3
Punch	2.0	Heading	16.6	61.9	56.1
Tilt	1.8	Flag Leaf	16.0	62.6	53.8
Least Significant Difference (5%)		-		1.5	9.4
Standard Deviation		-		1.0	6.3
Coefficient of Variability (%)		-		1.6	10.8

Summary: There were no significant yield differences in this trial. There were some visual differences when the treatments were evaluated in the field but none that indicated a yield advantage. The effectiveness and need for fungicides hinges on the amount of moisture received during the spring and the amount of tan-spot inoculum found on the wheat.

Control of Tan Spot on Winter Wheat

Objective: To control Tan Spot on winter wheat using fungicides at various rates. To assess yield potential of the crop when these fungicides are used.

TABLE 72. Control of Tan Spot on Winter Wheat with Fungicides. Pennington County (Wall) Richard Kjerstad Farm - 1992

Fungicide Treatment	Application Rate (Oz of ai/acre)	Time of Application	Percent Protein	Test Wt (Lbs/Bu)	Grain Yield Bu/Acre
Punch	2.0	Flag Leaf	15.2	62.4	62.7
Punch	1.5	Flag Leaf	14.6	62.1	62.0
Punch	1.0	Flag Leaf	16.5	63.1	60.3
Punch	2.0	Heading	15.2	61.9	58.8
Punch	1.5	Heading	15.1	62.3	58.3
Control	---		15.0		58.8
Punch	1.5	Heading	15.1	62.3	58.3
Control	---	---	15.2	62.2	58.0
Tilt	1.8	Flag Leaf	15.3	62.9	57.5
Least Significant Difference (5%)	-			1.5	6.3
Standard Deviation				1.0	4.2
Coefficient of Variability (%)	-			1.6	7.1

Summary: There were no significant yield differences in this trial. There were some visual differences when the treatments were evaluated in the field but none that indicated a yield advantage. The effectiveness and need for fungicides hinges on the amount of moisture received during the spring and the amount of tan-spot inoculum found on the wheat.

Control of Tan Spot on Spring Barley

Objective: To control Tan Spot on Spring Barley using fungicides at various rates. To assess yield potential of the crop when these fungicides are used.

TABLE 73. Control of Tan Spot on Spring Barley with Fungicides. Pennington County (Wall) - William Bielmaier Farm, 1992.

Fungicide Treatment	Application Rate (Oz of ai/acre)	Time of Application	Percent Protein	Grain Yield Bu/Acre
Punch	2.0	Flag Leaf	8.3	79.8
Punch	1.5	Flag Leaf	7.6	79.3
Punch	1.5	Heading	7.0	76.6
Tilt	1.8	Flag Leaf	6.8	75.9
Punch	2.0	Heading	6.9	73.1
Punch	1.0	Flag Leaf	6.7	69.7
Control	---	----	7.9	65.3
Least Significant Difference (5%) -				12.7
Standard Deviation				7.1
Coefficient of Variability (%) -				9.6

Summary: The two heavier applications of Punch at Flagleaf stage exhibited a significant yield response over the control. The effectiveness and need for fungicides depends on the amount of moisture received during the spring and the amount of tan-spot inoculum found on the barley.